Vol. 4, No. 3 MARCH, 1911

The FLEET OWNER

This Publication Called

To— ~~MR. BEATTY~~ 3/20
~~MR. KUEHN~~ 3/15

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Client Dodge Truck

Publ'n Fleet Owner

Date of Issue March 15 Page No. 21

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"For Those Who

The FLEET OWNER

Service Their Own"

Published Monthly by

The Ferguson Publishing Co., 90 West St., New York City

ARTHUR D. FERGUSON
President

A. L. CONLEY
Sec. and Treas.

HENRY CLAY FISCHER
Editor

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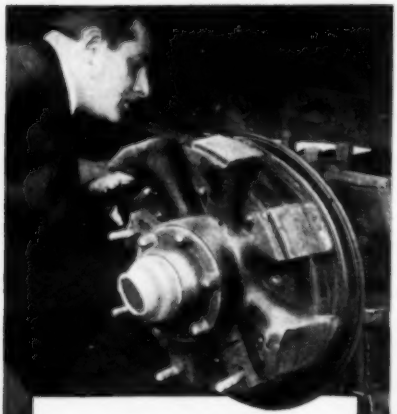
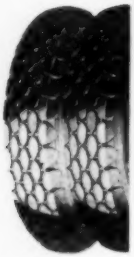


What TIRE *equipment should go* HERE?



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Goodrich Silvertowns

The FLEET OWNER

"For Those Who Service Their Own"

***PUBLISHED** monthly in the interests of Automotive Fleet Owners who maintain their own Repair and Service Shops, and devoted to the better operation and maintenance of Trucks, Passenger Cars, Busses and Taxis.*

HENRY CLAY FISCHER, Editor

Vol. 6 **New York, March, 1931** **No. 3**

What Do You Do With Them?

FROM time to time, the careful reader will no doubt have observed in the various manufacturers' advertisements in this publication and other trade magazines, that literature of some character is offered. In many cases this literature consists of an advertising poster, a trouble-shooting chart or some other attractive piece, intended for wall mounting. In others, handy booklets, catalogs and specification data are offered.

We know, from the great number of requests that come into our office, that fleet maintenance men like to get this literature, that they read it, and that it finds a place in their files.

One suggestion we might make is that wherever literature of this character is at all "hangable" that you *hang it up!* Many of our fleet shops have walls that are not entirely smooth and clean. It is unfortunate that the very nature of the work done in some of these shops, particularly the smaller ones, where the personnel is limited, is conducive to this condition.

Those ill effects that are brought about by this condition can be to a great degree remedied in a simple and inexpensive man-

ner—your manufacturers' posters. A neat arrangement of signs, posters and wall charts tacked or pasted to cover shabby walls will not only hide the shabbiness for the time being, but will have a marked psychological influence on the character of the work turned out by your men. The information given in the charts will be found valuable, it goes without saying. Try this—*it works!*

Analyzing Truck Operating Costs

IT is and always has been an almost impossible job to provide truck operating cost schedules or other data that would adequately answer the oft-repeated question, "What does it cost?" Fleet operators who have, in the past, written to various agencies or have otherwise tried to secure average data or figures that were fairly accurate have had little success in this direction, simply because "there ain't no such animal" that can be rightfully fitted to every line of business using trucks—and there are many, we all know.

Recently, in fact some months ago, a leading truck manufacturer prepared a very interesting analysis of truck operating costs—this from replies to a questionnaire that was submitted to thousands of truck operators in all lines of business.

From a copy of the analysis in our files, we find that a national tabulation of 5,584 replies to this questionnaire is recorded and that these truck operators have, in the aggregate, 46,017 vehicles of various capacities. The types of concerns participating in this survey include practically all lines of business, including firms trucking for hire, firms trucking "their own" merchandise and also municipalities operating fleets of trucks. All lines are included, from hardware to haberdashery.

Space does not permit the quoting of any figures from this analysis, but if you are interested, the Editor will be glad indeed to answer any questions pertaining to it, to quote any figures from it, or, if desired, to see that a copy of the complete analysis is sent to you without any obligation.

The Editor

How Our Fleet of 265 Motor Coaches of the Larger Type is Operated and Maintained

By P. V. C. See*

A FLEET of 265 motor coaches, mostly of the larger type, is operated by our associated companies, known as The Northern Ohio Power & Light Company, Akron, Ohio. Because we have bought out many different transportation lines, we have operated practically every make of motor coach, although at present, by retiring some of the different makes, the fleet is now composed of only seven different kinds.

We are using inspection garages which take care of the servicing and minor repairs of the motor coaches, as well as a heavy-repair shop. In laying out the inspection garages, the greatest amount of care was used in figuring out the movements of the coaches through the garages to secure the minimum amount of lost movement and congestion. Facilities for the rapid filling of gasoline tanks, oiling the engines and filling the radiators are installed just inside the entrances. A set of sprays for washing the coaches is also nearby. An arrangement for the cleaners to scrub the vehicles and a second set of sprays for rinsing them off completes the servicing arrangement. The coaches are then spotted to take care of any repairs, or if no work is necessary, they are located in position for going out the following morning.

To obtain and follow up information on motor coach maintenance it is very important to lay out the best form of clerical system so that the information can be secured accurately with a minimum amount of work, both on the part of the garage mechanics, who are very poor clerks, and the clerical force who must tabulate and make up the reports. To have mechanics do as little clerical work as possible, various forms have been designed that require the least possible amount of writing. *(Editor's Note: We hope to be able*

* *Supt. of Equipment, Northern Ohio Power & Light Company, Akron, Ohio.*

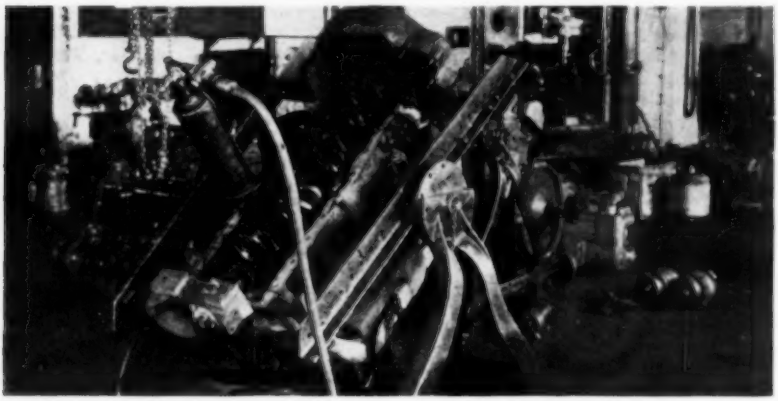
to illustrate and describe in detail these various forms in a forthcoming issue.) In the following paragraphs the various maintenance practices necessary in the upkeep of any fleet of motor vehicles, will be outlined.

Our shop for heavy overhauling is operated entirely independent of the garages. The general foreman does not order the motor coaches into the shop, this duty being attended to by the garage department which sends them in whenever any heavy overhauling work is required. The engines are run until they show signs of distress. An engine is "condemned" if any *one* of the following troubles develops:

(1) If it does not develop sufficient power for the service required.
(2) If the gas fumes become excessive.
(3) If the gasoline records show that it is using an excessive amount of fuel.
(4) If the oil records show that the oil consumption is too high.
(5) If any noise develops in the engine that cannot be located.
(6) If it shows low oil-pressure.
(7) If any part fails that may prevent the use of the engine.

Under this system we find that the average life between overhaulings is about 45,000 miles, while some engines have run well over 100,000 miles. When the coaches come to the overhauling shop, a list is made out on one of our regular forms that includes everything that the garage department feels should be done on the vehicle in question. If the engine is reported, the foreman in charge of the engine department looks up the records of the engine, finding when it was last overhauled and how much mileage it has done. With this information he is able to determine the probable amount of wear that has occurred in the engine.

If he finds that the engine has run over 35,000 miles he makes no further investigation but removes the engine and substitutes an overhauled one. If the mileage is low,



Testing for loose or worn main bearings. The cylinder shown is filled with oil, connected into the oil line, and the air-hose applied.

GUARD AGAINST THE TWO GREATEST DRIVING PERILS!

(1) . . . Blind driving in bad winter weather, when sleet, snow, ice-forming rain impair your windshield's clear vision.

The Protex Glass Company has perfected a method to eliminate this blind-driving hazard. By connecting the fine nichrome wires imbedded in Protex Sleet-Proof Glass to the storage battery, the glass can be heated sufficiently to prevent sleet, snow or ice from adhering to it. The method is simple and practical, and consumes a negligible amount of current.

(2) . . . Danger from flying glass. Protex Glass cannot fly! In case of severe accident, if the glass cracks, these fine horizontal nichrome wires will hold the pieces safely in the frame. Consider this when you equip your car or fleet—for 65% of all collision injuries are due to flying glass!

Protex Glass is solid plate glass . . . neither time nor exposure to heat or moisture can effect its visibility.

Investigate!

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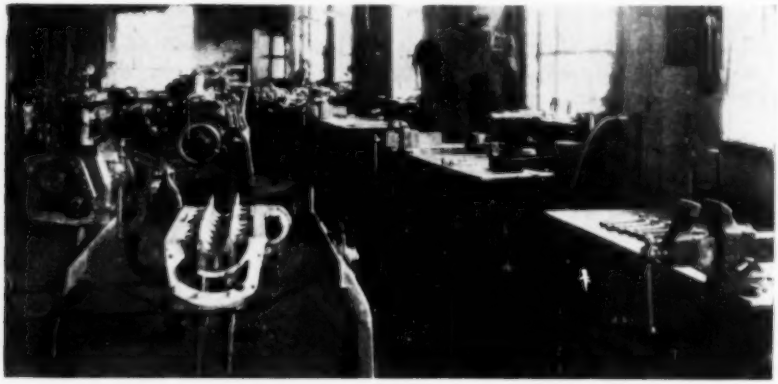
he makes compression tests, removes the head and pan of the engine and, if the trouble cannot be located, he removes the pistons and checks the entire engine assembly. He may then be able to make repairs without removing the entire engine, thereby saving considerable money.

In cases reported as "low oil-pressure" the trouble is usually found to be a loose or broken main bearing. An ingenious device has been developed in our shop for testing loose or worn main bearings. A cylinder holding about a half-gallon of oil was made out of a steel pipe; this is filled with lubricating oil and connected to the oiling system of the disabled engine. This device is shown in operation in one of the pictures accompanying this article. After the oil-pan has been removed from the engine a large drip-pan is put underneath to catch the excess oil. The shop air pressure is then applied to the top of the container, and the oil is forced out through the different bearings. A man who watches can easily see from which bearing the excessive quantity of oil is coming. With this device, it is often possible to trace out the loose main bearing that is starving the connecting rod bearing.

In the shop, the work is delegated to specially trained men who do one class of work so far as possible. The men who remove the engines and other units from the coaches do not repair these units; they substitute units that have been overhauled by other men who are specialists in their respective work. Probably the most highly specialized men that we have are the engine rebuilders.



A portion of the engine-repair room. Note the many engine stands and the unusual amount of daylight.

In removing the engines from the coaches, a pit is used that is similar to the pit used for removing armatures from street cars, having a cross-pit at right angles to the main pit. The coach passes over the auxiliary pit on two oak planks which are bound with angle iron for guards and are removed after the coach has been "spotted." An air-actuated jack mounted on a small

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VISCO - METER Cuts Mileage Costs . . Prolongs Motor Life . . Increases "Road Power" . .

CORRECT lubrication is the first step toward economical engine operation. Visco-Meter makes correct lubrication simple and sure.

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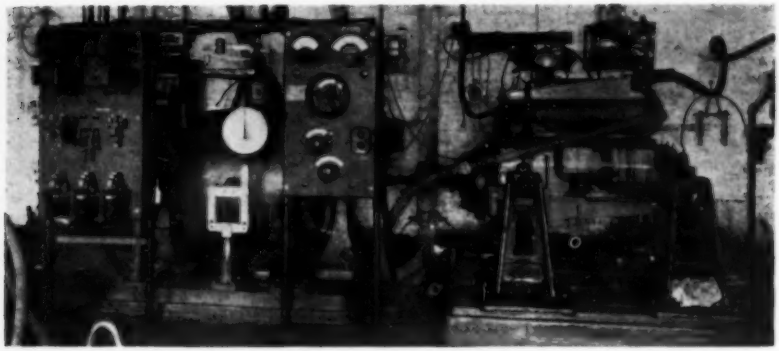
Friction is reduced, and along with it, excessive motor-wear. Mechanical failures and repairs are minimized; the life of the engine prolonged. Visco-Meter helps keep your trucks on the road! It also effects worthwhile economies in fuel and oil.

Visco-Meter is ruggedly constructed and easy to install. Get all of the facts at once. Visco-Meter Corp., 318 Grote Street, Buffalo, N. Y.

The VISCOMETER

Takes the Guesswork Out of Motor Lubrication



Testing a rebuilt engine on the dynamometer. This one will first "run-in" the engine and then provide accurate power readings.

car is provided, which operates on a steel track laid in the cross-pit. This jack raises the engine and allows it to be moved clear of the supports. It is then lowered clear of the coach and the car is moved out from under the coach, where a travelling crane picks it up and conveys it to the engine department.

In rebuilding an engine, the crippled engine is removed from the coach by the floormen and brought into the engine room, a portion of which is shown in one of the pictures. The transmission is first removed and sent to the transmission repair room. The engine is then completely dismantled, all parts either being cleaned in gasoline or in a tank of hot alkali.

The crankshaft, cylinder-block and other parts are first checked for wear. If there is sufficient stock in the crankshaft, it is mounted on an external grinder and trued up. The main bearing journals are all ground to the size of the smallest one and the crankpins likewise. This is done so that when boring, it will only require one setting of the tool to completely bore the crankcase. The cylinder blocks are gauged and mounted on an internal cylinder grinder, being then bored out to the nearest 0.005 in., and the pistons, which are purchased in a semi-finished size, are ground to fit. We are usually able to get four regrindings out of a single cylinder block. Where rebabitting of bearings is necessary, we use S.A.E. No. 11 bearing metal.

After the overhauling is completed, the engine is mounted on a dynamometer, of which we have two. One of these is home-made, from a street-car motor with shunt-wound fields. This apparatus gives very good results in testing anything up to 60 h.p. For the larger engines, we use a 150 h.p. dynamometer, shown in one of the pictures. The rebuilt engine is "dragged" by the dynamometer for about three hours, using plenty of oil in the engine; the horse power required to drive the engine is recorded. During this time the temperature of the water running through the engine is recorded. We have certain limits for the frictional horse power and these limits

TRUCK MONEY GOES *FURTHER* ON FIRESTONES

NOT MILEAGE ALONE, but *low cost per mile* that's what you want from your truck tires. And that's what you *get* from Firestone Truck Balloons.

That investment of yours in trucks—are you getting the most out of it? In mileage? In low cost per mile? In less wear and tear on the vehicle itself?

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TRUCK BALLOONS

BATTERIES • BRAKE LINING • RIMS • ACCESSORIES

must be reached before the engine is run under its own power.

Illuminating gas is used for fuel for the first six hours, when about three-quarters of the rated horse power of the engine is developed. Then an engine test is made using gasoline for fuel, taking tests for both horse power and torque. A final reading is then taken of the compression on each cylinder to make sure that the piston rings and valves are functioning properly. The engine is then ready for use. A record is kept of the man who did the work and the number of hours required to complete it. We usually find that an overhauled engine gives us as great a life as a new engine.

The transmissions and differentials are handled in one department, where they are completely dismantled, the gears and bearings inspected and the parts reassembled. We have designed special stands for handling this work, made from old car wheels and axles, which are very rigid and easy to work around.

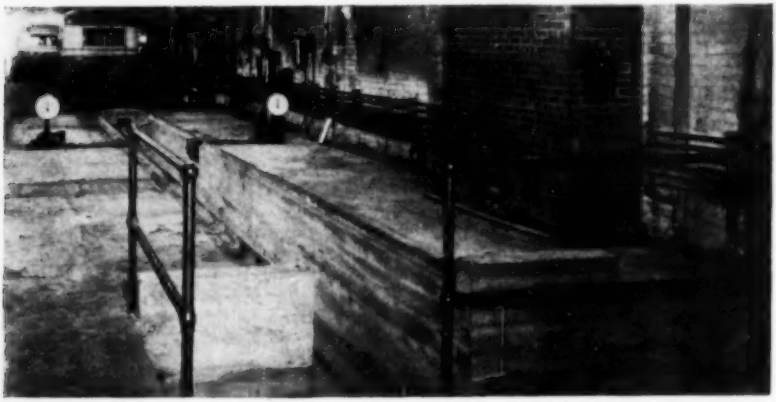
Work on the air-compressors and valves is done in the air-pressure room, by the same men who handle the street-car air-compressors and air-valves. The compressors are tested by pumping against standard orifices.

Generators and magnetos are handled as part of the street-car armature room work. The use of the magneto is being gradually discontinued. Our rule is that if magneto repairs will cost over $15, the magneto is to be taken apart and used for spare parts and a battery-distributor unit substituted.

Radiators are handled in conjunction with our tin shop. Testing and washing tanks are installed and all radiators are tested under pressure. We have found it much cheaper to do our own radiator work, and our radiators stand up better than those repaired in local radiator shops.

Body work is done in the street-car carpenter shop, which is fitted with every kind of wood-working

(Please turn to page 65)



All brake adjustments are made over these brake-testing pits. Brake records are kept and filed for future use.

ATTACK High Maintenance COSTS

Replace with **LEMPCO GUN ALLOY**

BRAKE DRUMS
AXLE SHAFTS
WORM GEARS

Too many adjustments—repairs — replacements — that's what makes maintenance costs despairingly huge. Lempco replacement parts will keep costs down where they ought to be. For instance, Lempco Gun Alloy Brake Drums outlast ordinary drums 3 to 5 times —increase brake lining life 200% to 300% and eliminate 75% of all brake adjustments. Lempco Axle Shafts and Worms and Gears cut maintenance costs just as thoroughly.

Years of diversified experience in all phases of engineering, metallurgy and heat treating enable Lempco to produce replacement parts superior in quality to any on the market at advantageous cost to you.

Decide—Now—to standardize on Lempco parts. They'll cut repair and replacement costs in a remarkable fashion. Lempco Brake Drums, Axle Shafts, and Worms and Gears are supplied for practically every truck, bus and taxicab in operation. Your nearest Lempco distributor can supply you immediately.

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LEMPCO PARTS

MAINTENANCE PROBLEMS of the FLEET OWNER

By **A. Geo. W. Brown***

NEW ideas in maintenance are measured in terms of "how well do they work?" and not "how well do they sound?" Cold hard facts are the gauge, not words. The first things the practical maintenance man wants to know about a new idea are:

(1) Does it increase the life of the parts?

(2) Does it enable more enduring jobs?

(3) Does it permit of more speedy accomplishments?

Meriting the attention of every large fleet operator is the plan of buying oversize parts, such as pistons and piston pins, and, after first using them in cylinder blocks that have been reground a number of times, subsequently refinishing them to smaller sizes.

The economics of using oversize parts are two-fold. First, there is the reuse of units which formerly were thrown away, second the possibility of salvaging such parts when blocks are finally discarded for refinishing to fit other blocks.

Close study should be given by the maintenance department to the development and application of special tools to do a particular job.

All told, the procedure followed in getting the most miles per maintenance dollar should be considered by all who are interested in better and more adequate maintenance.

Economies that can be effected in shop work with a standardized fleet are the inventory of spare parts and the efficiency of labor.

When the fleet operator's repair stations are inconveniently located from source of supply for spare parts a larger inventory becomes

* *Automotive Engineer, Borden's Farm Products Company, New York City.*

essential, especially in the case of a mixed fleet. With a standardized fleet, and the consequent need for a lesser number of classes of spare parts, the inventory burden can be lightened.

In the case of shop labor, the results secured from a localized or specialized repair clinic are less costly, both from time involved and the quality of work done, than those of a shop where abrupt changes in handling replacements, repairs and overhauls are the rule.

Shop labor performance is a measure of the ability of the mechanics to individualize their work. This achievement is delayed so long as a mixed fleet is maintained.

It is not what a repair force can accomplish during an off-peak period, but how it behaves and produces when forced to work at top speed that really counts in truck maintenance. It is only necessary to picture conditions when one vehicle after another comes into the garage for repair or adjustment. It is then that the poise and morale of the mechanics are tested. If the force is flustered, the work performed stands a good chance of being poorly handled. If it is calm and collected, then the work receives the attention necessary for accuracy.

Quality workmanship is essential at all times and not only during "fair weather" periods. Failure to put out quality work during a rush period only prolongs the time that vehicles stay out of the shop for normal periods. It is the time spent on repeat work that is so wasteful in shop practice. Therefore, if modern tools, because of their time and labor-saving features can be instrumental in eliminating temporary repairs, on that single point alone they prove a merited and worthwhile investment.

Compare this with the investment in one spare vehicle for emergencies, which is generally all that an owner with ten or less trucks can afford. Additional vehicles are a burdensome form of insurance against repair and traffic tie-ups. The economical policy is to standardize the fleet and invest in the proper number of replacement parts or units and equip the shop with such time and labor-saving tools as will handle repairs efficiently, whether in regular order or emergencies.

The repair force will normally remain the same in either case. Therefore, why handicap it in time of emergency?

To determine the fitness of certain materials or accessories for truck service many officials are in the habit of testing them in their private automobiles. Spark plugs, ignition coils, gasoline and oils are a few of the items that undergo initial tests in the "personal car laboratory." In but very few instances can these demonstrations be of practical value in determining the stamina of a purely truck accessory. It

(Please turn to page 64)

This Practical Analysis of Fleet Maintenance is Concluded from Our February Issue

Under-Inflation

Good for Your Stomach Bad for Your Tires

Some Facts and Figures Concerning the Bandit that Robs You of Tire Milege

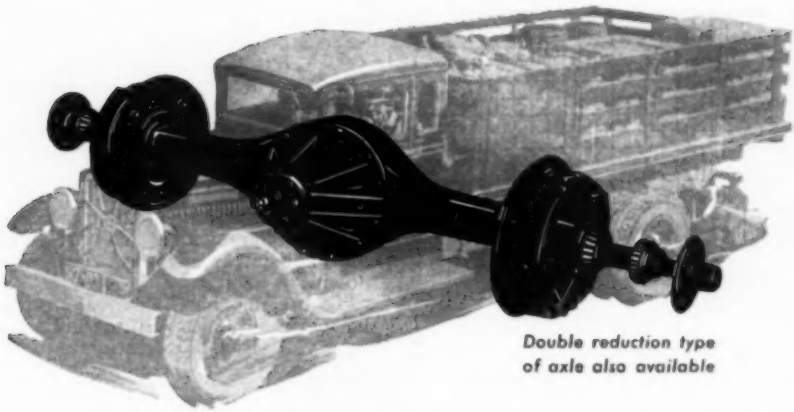
UNDER-INFLATION is probably the chief cause of premature tire wear. Whether the responsibility for proper and correct tire inflation rests with your individual drivers, or whether the "check-out" man has tire-inflation listed among his many duties, it is not sufficient simply to advise these individuals that inflating their pneumatic tires to a certain pressure is all that they need do to obtain entirely satisfactory service. You must impress them that they must *maintain* this pressure in order that you will get the maximum mileage that the maker has built into the tire.

The menace of improper inflation cannot be stressed too greatly. Without question, it reduces tire life tremendously. When a balloon tire is run as little as five pounds below its proper pressure, its life is reduced by hundreds of miles. According to actual tests, a balloon tire that is under-inflated five pounds depreciates just as much as a high-pressure pneumatic that is under-inflated by twelve or fifteen pounds. Every fleet owner knows just what will happen to tires that are run *under* the required pressure. Perhaps the most common and most costly result is premature tread wear. After that comes broken-down side walls and rim cuts. Other damages which cannot be seen, such as inside flexing breaks in the cords, carcass ruptures, tube-pinching, chafing, etc., are also done by under-inflation.

It is so easy to avoid all the above evils and yet how many vehicles do we see on the streets with almost "flat" shoes, wearing, wearing and wearing out their tires prematurely?

Many, indeed, particularly where dual pneumatic wheels are used, in which case it is not infrequently that one observes one or two of the four rear tires flat or almost flat.

Four precautions are all that's necessary to guard against the evils of under-inflation. *First*: Find out the correct tire pressures as recommended by both the maker of the vehicle and the tire, front and rear. A simple wall-chart can be made up by someone in the office, which should be posted at the exits, at the



Double reduction type of axle also available

AXLES FOR HEAVY-DUTY WORK

From front bumper to rear frame cross-member, Dodge Heavy-Duty Trucks are "all-truck" — expertly-designed and precision-built for gruelling work.

The rear axle, for instance, is the full-floating type. Weight of truck and load is carried by the housing—shafts are free to transmit power solely. Drive is through spiral bevel gear. Pinion gear is straddle-mounted for greater strength and permanent alignment. All gears are of finest nickel alloy steel. There are nine large adjustable roller bearings in all—two at outer end of each shaft. Housing of the banjo type is of electric furnace steel.

* * *

THE COMPLETE LINE OF DODGE TRUCKS RANGES IN PAYLOAD CAPACITIES FROM 1,200 TO 11,175 POUNDS—PRICED, CHASSIS F. O. B. DETROIT, FROM $435 TO $2695, INCLUDING 1½-TON CHASSIS AT . . . $595

DEPENDABLE

DODGE HEAVY DUTY TRUCKS

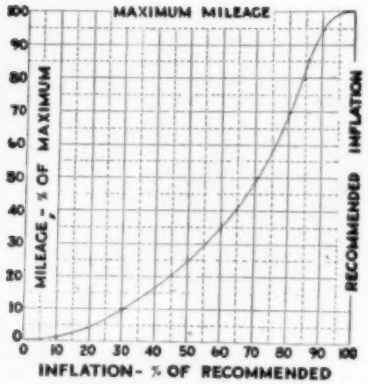


Chart showing how proper tire inflation has a direct bearing on tire mileage.

air-hose and also at any point where drivers are gathered. A space should also be reserved for this on every bulletin board.

Second: Every tool kit in every vehicle should include a reliable tire gauge and the drivers should be continually reminded of their tires (where this is the system) and the necessity for *maintaining* the correct pressure. One or two service gauges should also be stationed at the air-hose and the exits, where this system of checking prevails.

Third: Every valve-stem on every tire should be covered with a proper, efficient dust-cap—one that is air-tight up to 250 pounds. In the event of a damaged valve inside, which it must be remembered, is a very delicate piece of mechanism, a dust-cap will prevent the escape of air at the mouth of the valve, until such time that the valve-inside is replaced.

Fourth: Change your valve-insides frequently. Where extreme service is required of the vehicle, every six months is not too often to replace the valve-insides.

Tire inflation has a direct bearing on tire mileage, as shown on the chart appearing on this page. There is one correct inflation for every condition of service, and to secure from a tire the maximum mileage that has been built into it, it is necessary to maintain at all times the exact recommended air pressure and not let it vary either up or down.

To use the chart, locate along the bottom line the per cent of inflation that you wish to investigate. For instance, 70% as an example of 77 pounds in an 8" H. D. Pneumatic.

Follow this 70% line up the page to the point where it touches the heavy curve. Turn at this point and move straight left across the page to the edge of the chart, where a reading can be made in per cent of maximum mileage to be obtained; in this example about 48%.

Thus, it will be seen that an under-inflation of 30% means a loss of mileage of 52%.

HOW LOADS AFFECT TIRE MILEAGE

Where load exceeds tire capacity—

100%	Load means....	100% Tire Mileage
110%	Load means....	83% Tire Mileage
120%	Load means....	70% Tire Mileage
130%	Load means....	60% Tire Mileage

Where tire capacity exceeds load—

100%	Load means....	100% Tire Mileage
90%	Load means....	123% Tire Mileage
80%	Load means....	155% Tire Mileage
70%	Load means....	200% Tire Mileage

In many instruction books you will find the warnings, "Don't let your pressures drop more than three pounds before reinflating the tires," and "Check your pressures every day with a tire gauge."

Aside from porous tubes and slow leaks, the valve is the most likely point at which a loss of air

Style

was

important

so the custom body builder chose Alcoa Aluminum . . .

Department stores, smart shops, stress style. Their show windows reflect it, interiors express it. Style is carried even into the delivery of their merchandise.

Naturally, they specify style as a primary requisite of the custom-built bodies for their trucks.

And what material for the bodies did the builder choose? He chose the most suitable metal—Alcoa Aluminum. Why? Because the bodies of smart delivery trucks must be more than just "boxes." They must have rounded edges and corners, streamline effects and panels without seams.

Sheets of strong Alcoa Aluminum alloys for body panels and doors are available in sizes up to 48 inches by 216 inches. They are easily worked into smooth, rounding surfaces. Their light weight makes them easy to handle in the shop.

In service, they do not warp or splinter. Style built into bodies of Alcoa Aluminum, stays there. Being rustless and corrosion-resisting, paint adheres securely to Alcoa Aluminum surfaces and needs renewing less often. Maintenance costs are reduced —and, these bodies last longer.

There are also available from stock, in sizes suitable for truck bodies, standard structural shapes of the strong alloys of Alcoa Aluminum possessing the strength of structural steel, but only 1/3 as heavy. These shapes used with Alcoa Aluminum alloy sheets, rivets, bolts and screws save, on heavy duty trucks, as much as 1,500 to 6,600 pounds dead-weight. This means less gas, oil and tires, or increased payload. These weight-savings often pay for the additional cost of the aluminum body in less than a year.

Whether it be style or economy, or both, the strong alloys of Alcoa Aluminum answer the need.

May we send you the booklet on Alcoa Aluminum for truck bodies, showing details of construction? Please address ALUMINUM COMPANY *of* AMERICA; 2461 Oliver Bldg., PITTSBURGH, PENNSYLVANIA.

ALCOA

ALCOA ALUMINUM

can take place. It should be remembered that the valve-inside is a very delicate piece of mechanism and its air-sealing qualities depend entirely upon the little brass cone obtaining a perfect seating into the rubber gasket which is placed within the brass cup just above the spring of the valve plunger. Any small particles of dirt or even grease might interfere with the proper functioning of the valve inside at this point, causing leakage.

Moreover, this seal must be broken each time the tire is inflated, and the small piece of dirt necessary to cause leakage may enter the valve seat at any time during inflation and lodge upon the seating, so that one cannot be sure that when he obtains an airtight valve after one inflation, that it will continue when the tire is inflated again.

In other words, tire valves should be under a constant check to be sure that lack of sufficient air pressure is not robbing you of tire mileage. There should be a regular inspection of tire valves, at scheduled intervals.

When valve caps, or dust caps, are not used, as is often the case, you are depending entirely on the valve-inside for retaining the air pressure. The advantages of dust caps as a secondary seal are quite obvious, inasmuch as they provide extra protection against the menace of under-inflation.

In connection with the subject of leaky valves and lack of valve caps, a survey made some time ago by a leading tire manufacturer will be of more than passing interest. Checks were made in various cities, on a total of 1,087 tires on parked cars and trucks. Of the total 1,087 tires checked, 402 or 37 per cent were found to be *under-inflated*. Of 581 tires checked to determine whether the valve insides were holding air or leaking, 210, or 36 per cent were found to be leaking air. This is graphically portrayed in the chart appearing on this page.

Another interesting point developed in the survey was that of the total 1,087 tires checked, approximately 20 per cent were found in which the valve caps were not screwed on the valves tight enough to obtain a secondary seal, which could be obtained were it properly placed on the valve.

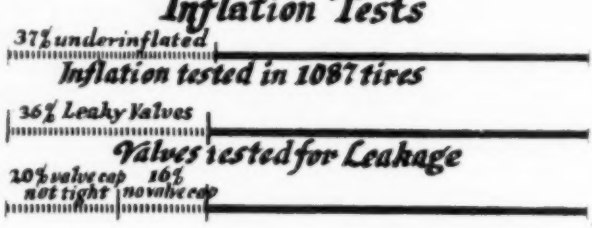


Chart showing different percentages in inflation and valve tests made during a survey. The black lines represent the remainder of the tires, which were not under-inflated.

REO Fulfills Every Need of Reliable Haulage

The Reo is the fastest and most easily driven of full-sized commercial vehicles having all-truck design and construction. ¶ Reo records of low-cost, long-life operation have never been disputed. ¶ Reo power and ruggedness, Reo safety and control, Reo riding comfort and saving of driver fatigue—are advantages operators seek and appreciate. ¶ Moreover, Reo-designed bodies are perfectly suited to reliable haulage needs and possess the advertising asset of fine appearance.

REO MOTOR CAR COMPANY, LANSING, MICH.

SPEED WAGONS REO AND TRUCKS

Under-Inflation

(Continued from page 24)

One hundred and seventy-three tires, or 16 per cent of the total, had neither valve cap nor dust cap, and so were entirely dependent upon the valve inside for retaining the air pressure.

Because 36 per cent of the 581 tires which were checked for leaky valve-insides were found to be leaking, this indicates the necessity for using valve caps for additional seals, in preventing loss of air pressure.

It would be a good idea to explain to all your men, including drivers, the value of keeping their valve-insides in good working order, thus insuring an air-tight seal; show them why the valve caps and the dust caps are extra protection for adequate tire inflation and, of course, ultimate tire mileage.

In testing for leaky valves without going to the trouble of removing the tire from the vehicle, the *time-honored* "spit" method seems to be still a satisfactory means. A little saliva, transferred with the finger from the tongue to the exposed valve stem will quickly show up whether or not the valve leaks. If bubbles appear the valve leaks; if no bubbles—no leaks.

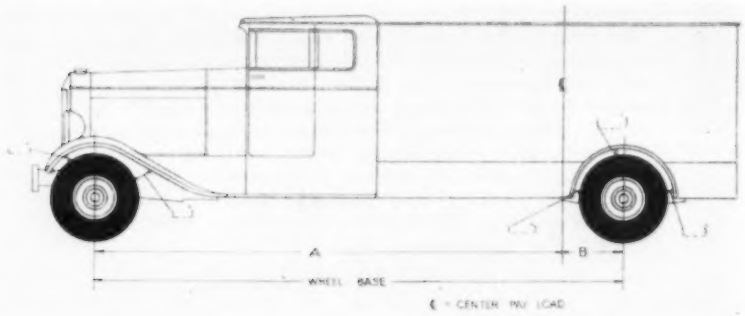
Determining Truck Tire Sizes

THE basis of successful tire operation hinges on the selection of the right tire equipment. It is very important that sufficient tire capacity be applied to handle the pay-load plus the empty vehicle. The diagram on this page serves to illustrate the following formulae, which in turn give wheel loads on both front and rear axles:

$$\frac{B \times \text{Pay-Load}}{\text{Wheel Base}} = \text{Pay-load on front axle}$$

$$\frac{A \times \text{Pay-Load}}{\text{Wheel Base}} = \text{Pay-load on rear axle}$$

B represents the distance from center of pay-load to rear axle; A from center of load to front axle; the wheelbase, of course, being from front to rear axle. The front and rear axle weights thus obtained are added to the weights of the empty vehicle.



How to determine the gross wheel loads on front and rear axles where no platform scale is readily available.

• WORTH READING •

Aluminum Bodies: Cost information showing savings to be made by the use of aluminum bodies, may be obtained, free of charge, from Aluminum Company of America, 2461 Oliver Bldg., Pittsburgh, Pa. This interesting literature should be in every fleet owner's hands.

"Fourteen Reasons Why" is the title of an interesting folder that explains and outlines the advantages of light-weight cast-iron pistons. Many good pointers on pistons are included. The booklet may be obtained free of charge from DeLuxe Products Corp., 310 Lake St., La Porte, Ind., or from the Editor.

Dodge Trucks: Interesting booklets on all types of Dodge trucks, busses, delivery and other vehicles are offered by Dodge Brothers Motor Corp., Detroit, Mich. When writing, please state the type of vehicles you are interested in.

Water Pump Parts, packings and kindred items are illustrated and described in the latest edition of the Grapho Catalog, just off the press. A free copy may be obtained from Grapho-Metal Packing Co., Indianapolis, Ind.

Brake Drums; Axle Shafts: Catalogs that completely describe these two lines of important major replacements, are offered by Lempco Products, Inc., Bedford, Ohio. A copy should be in every Superintendent's hands. Write directly to the company for same, or to the Editor, if you prefer.

Brake Reliner's Manual is offered free by Johns-Manville Corp., New York City, N. Y. This is a comprehensive handbook covering all aspects of the application and servicing of brake lining. Should be in the hands of every fleet operator. Will be promptly sent without cost if you mention this publication.

Valve Lifters; Wheel Pullers: New lifters to service the latest models of cars, trucks and busses have been developed by The K-D Mfg. Co., Lancaster, Pa. Wheel pullers of various types are also offered. A series of small tool literature will be sent to you free, if you mention this publication when writing.

Brake Material Book entitled "Friction Materials for Buses" is offered free to those in the bus business. This contains an interesting discussion on modern frictional materials used in present-day brakes. Write to Johns-Manville Corp., New York City, for your free copy.

Wheel and Sprocket Pullers: Interesting literature on wheel pullers, sprocket pullers and other truck service tools, is offered free of charge by The Greb Company, 310 State St., Boston, Mass. Fleet owners are invited to write for this.

Smooth-On Repair Manual will be sent free on request. This is an interesting book that tells how to stop leaks of various kinds; how to fix cracks quickly; how to make threads hold tightly and how to mend various articles at low cost. The book may be obtained from Smooth-On Mfg. Co., Dept. 71, 574 Communipaw Ave., Jersey City, N. J.

Thompson Valves are interestingly described in new literature that will be sent free to any of our readers. If you are interested in valves it will pay to write for this. Address Thompson Products, Inc., Cleveland, Ohio.

Nonscor Brake Lining is described in a new catalog issued by Union Asbestos & Rubber Company, 18th St. & 54th Ave., Chicago, Ill. This is a flexible brake lining that is said to be ideal for internal and external brakes. Write for full information, mentioning this publication.

Vellumoid Packings: Samples of Vellumoid sheet packings and ready-cut gaskets will be sent to you if you are inested in these products—and you should be. Address The Vellumoid Company, Worcester, Mass. When writing, please state whether the literature only is desired, or if you want samples too.

Willard Batteries: A catalog on heavy-duty batteries for truck and bus service will be sent to any reader on request. Write directly to Willard Storage Battery Co., Cleveland, Ohio, mentioning this publication.

Note: All of the above books are offered free of charge. Write for any that interest you. If this is your busy day, tear out the page, check those desired and mail to the Editor. We will see that you are promptly supplied.

What Size OIL *Do You Wear?*

S.A.E. System of Numbering Lubricating Oils is Based on Their Viscosity

THE Society of Automotive Engineers, with the cooperation of leading automotive and oil manufacturers, has developed a uniform system of standardizing *viscosity* of oil. This system has been called the S.A.E. Viscosity Numbering System, and as the name implies, concerns itself *only* with that one property of oil. Hitherto, oils in the various different brands have been marked *light, medium, heavy, extra heavy*, etc. This represented merely a classification system for each individual manufacturer, and naturally resulted in a wide variation between brands; so much so, in fact, that in one case an oil marked "light" by one manufacturer actually possessed a body or viscosity heavier than one marked "heavy" by another company.

Under the new system it is possible for the automobile manufacturer and dealer to instruct motorists and fleet operators as to the exact oil viscosity needed for particular driving conditions. The system is very simple. The possible oil viscosities have been arbitrarily divided into six groups, ranging from very light oil, which is now marked S.A.E. Viscosity No. 10, to the extra heavy oil which is marked S.A.E. Viscosity No. 70. The vehicle owner is now instructed to use, for example, S.A.E. No. 40 for summer driving and S.A.E. No. 30 for winter driving.

In other words, like ordering a collar by size or number, which does not in any way affect the quality of the linen going into it, oils may now be ordered by size or consistency of body, that is, *viscosity*. The S.A.E. number has nothing whatever to do with the quality of the oil, which is determined by the refiner or manufacturer.

While there are many factors which go to make up the quality of a motor oil and which affect the service it gives, there is no question but that the viscosity or body of the oil is its most important single property. Indeed, say the lubrication experts, a fair quality oil of proper viscosity will give better results than an exceptionally good oil of improper viscosity or *body*

for a given purpose.

It is obviously impossible for the automobile manufacturer to enable the customer to distinguish all the elements of quality, but it is both possible and important to find some dependable method of advising him as to the proper viscosity of oil for use in a given car under given conditions, and unless this is done the extensive research of oil manufacturers and automobile men to determine this correct body becomes of negligible value.

Standardization of this kind is only valuable when it comes into general use. The automobile manufacturers have indicated in their instruction books the S.A.E. number of the oil to be used and the manufacturers of lubricating oils have clearly marked their oils to show these numbers. Fleet owners can assist in bringing this standardization of oil viscosity into use by asking for motor oil in accordance with the designation of the Society of Automotive Engineers.

Crankcase Lubricating-Oil Viscosity Numbers
S. A. E. Recommended Practice

Viscosity Number	Viscosity Range Saybolt Universal, Sec.	
	At 130 Deg. Fahr.	At 210 Deg. Fahr.
10	90–120	.....
20	120-185	.....
30	185–255	.....
40	255–	–75
50	.....	75–105
60	.....	105–125
70	.....	125–150

In the case of prediluted oils, S. A. E. Viscosity Numbers by which the oils are classified shall be determined by the viscosity of the undiluted oils.

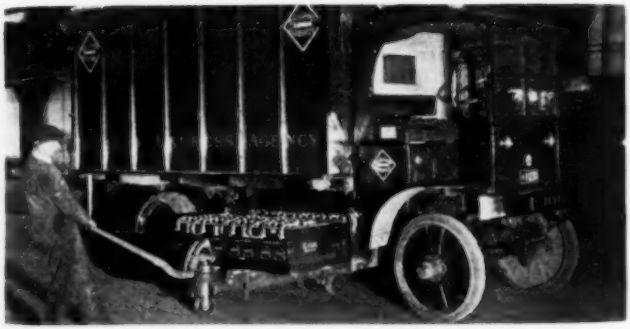
Wherever the S. A. E. Viscosity numbers are used on prediluted oils, the container labels should show in some suitable manner that the S. A. E. Number applies to the undiluted oil.

The S. A. E. Numbers constitute a classification of crankcase lubricating oils in terms of viscosity only. Other factors of oil quality or character are not considered.

This S. A. E. system is based upon numbers, as indicated by the accompanying chart. As noted the measured viscosity in seconds by the Saybolt Universal Viscosimeter is taken at 130 degrees and 210 degrees Fahr., to provide a knowledge of the relative change in fluidity between average operating crankcase temperatures.

Obviously the adoption of this system will go far to eliminate the necessity for using descriptive terms such as light, medium, heavy, etc., which at best have proven decidedly misleading. On the other hand, the fleet owner must remember that S. A. E. numbers cannot be taken as a criterion of quality. The reputation of the individual refiner must be depended upon in this regard.

"We flush the cooling systems every 2,000 miles. The radiators are flushed while the cars are on the wash rack, using clear warm water only. This helps the general performance very much and prevents overheating. We only use antifreeze in a few cars, preferring glycerine and Prestone, because they give off no fumes. We use no radiator shutters."—*C. E. Moore, Supt. of Maintenance, Buckeye Stages, Inc., Columbus, Ohio, operating a fleet of 50 busses, 2 trucks and 10 passenger cars.*



Servicing 136 Electrics

How the Railway Express Agency's Chicago Fleet of Electric Trucks is Efficiently Maintained

By S. M. Boyne*

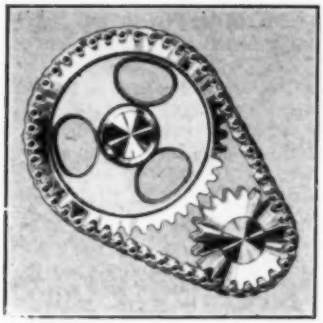
ALTHOUGH the average fleet maintenance man is familiar with electric truck operation on the road, it might be interesting to take a look behind the scenes and see what goes on while the electric truck is being serviced. The electric truck garage of the Railway Express Agency in Chicago is a good example of the latest methods of handling this type of automotive vehicle. In this particular garage we can take care of any number of trucks not exceeding 150 during the charging period of 8 p. m. and 8 a. m., and 96 batteries can be charged simultaneously.

The electric current is brought into our garage at a "pressure" of 12,000 volts A. C. This is reduced to 2,000 volts by transformers and is then passed through the motor-generators to the charging switchboard of 96 panels—one panel for each battery on charge. The function of the motor-generators, of course, is to convert the current from A. C. to D. C., and to reduce the voltage to 110, at which "pressure" it goes to the batteries.

On the completion of a day's run, each truck comes into the garage and it is placed in a stall where it can be conveniently handled by the mechanics and battery attendants. The foreman of each shift inspects each truck on its arrival and logs any adjustments and repairs that may be necessary. If it should be needed, the truck is taken to the wash-rack, where the washer gives it the necessary attention. The greaser next sees that all the moving parts are thoroughly lubricated.

Next a battery attendant inspects the battery and removes any corrosion or dirt that may have ac-

* *Battery Charger and Mechanic, Railway Express Agency, Canal Street Garage, Chicago, Ill.*



DUCKWORTH
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TIMING CHAIN

Duckworths mean longer life because special attention is paid to the places where normal wear occurs.

Link surfaces are ground to absolute uniformity. A Duckworth Chain doesn't have to "wear in"—and then be adjusted. Efficient oiling is assured by the hollow split pin construction.

And finally, they are easy to install because each chain, though made "endless," comes with a master pin and cotter.

N.A.P.A.

Sold and endorsed by N.A.P.A. Jobbers and Distributors in United States and Canada.

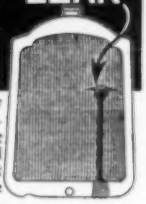
BALDWIN-DUCKWORTH CHAIN CORPORATION

Duckworth Division

SPRINGFIELD, MASSACHUSETTS

D U C K W O R T H

STOP THAT LEAK WITH SMOOTH-ON No. 1



YOU can apply Smooth-On with radiator full or empty, hot or cold, without removal from the car and without putting anything inside that clogs the circulation.

Merely roll the Smooth-On into a stiff putty, press it against and into the leak with your thumb or pack it into the defect with a knife blade or screw-driver, and scrape off the excess. The leak will stop instantly and the repair is permanent.

Cracked Water Jackets

Water jackets of automobiles, stationary or marine gas engines which have developed long or short cracks or have even had pieces broken entirely out from freezing can be made thoroughly and lastingly serviceable by similar repair, or by applying Smooth-On under straps or a plate.

Get Smooth-On No. 1 in 7 oz.; 1-lb. or 5-lb. tins at any hardware store or if necessary direct from us.

Free Booklet

tells how to stop gas leaks from the tank, gasoline lines and exhaust system, oil leaks at gaskets and at cracks in crank or gear case. It also tells how to make headlight posts, nuts, hub caps and belts and grease cups stay tight, etc.

Mail coupon for a copy.

Write for FREE BOOK

Do it with **SMOOTH-ON**

SMOOTH-ON MFG. CO., Dept. 71,
574 Communipaw Ave., Jersey City, N. J.

Please send the free Smooth-On Repair Book.

Name .....

Address .....

3-31 .....

cumulated on the terminals or battery boxes. He then adds sufficient distilled water to the cells to compensate for the loss by evaporation. By this time, the mechanic is attending to the running repairs. It now only remains to charge the battery. When it is necessary to change the battery, this is easily accomplished by means of an electric lift-truck, or jack.

The battery in the truck may be a forty-four cell, nineteen-plate lead battery and one of forty of that type in the garage; yet by reason of its age and discharge it may have little in common with the remainder, as far as charging is concerned. Batteries, in some indefinable manner, appear to have individuality and it is the main part of the charger's job to know just how each battery reacts to the charge given to it.

Next a charging receptacle is inserted into the truck which connects the battery with the charging switchboard. A tapering charge of sixty to eighteen amperes is put into the battery over a period of four to six hours. At the end of this time the condition of the battery is checked by gravity and temperature readings. If all is well, as usually is the case, the chauffeur climbs into the cab and again the truck is on the job for the Railway Express Agency.

Charging during working hours, using outside connections.

Besides charging the batteries in the garages and shops, provision is also made for "outdoor charging." In the Long Island City (New York) terminal, for instance, outside plug connections are placed on the front walls of the loading platforms, so that vehicle batteries can be charged while the trucks are being loaded, without taking them from service. The value of this plan is quite obvious.

Our Chicago garage ranks third in the number of electric trucks handled. Its methods are similar and typical of those of the Company in other cities, the largest of which is in New York City, with 535 electrics whose batteries are charged in Company quarters. This garage, located at East 42nd Street, maintains a large number of spare batteries that can be charged while the trucks are on the streets.

Philadelphia comes second, with 174 trucks, and Chicago follows that with 136, while Boston ranks fourth, with 114. Electrics are also employed in varying numbers in nineteen other cities, where in practically every case the charging of batteries is handled by the Company's own equipment. The Chicago garage is in charge of Superintendent J. Elliott, assisted by Assistant Superintendent J. H. Glenney.

(Please turn to page 66)

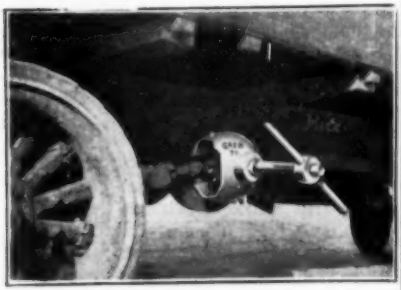
WANTED!

¶ On page 35 is a form, ready to be filled out. Maintenance men are urged to cooperate in joining this new form of "club."

¶ In order to become a "member" it is simply necessary to participate in these questions and answers, only when you choose to do so, of course, there is *no* fee, *no* dues, and no limitations.

¶ We would like to see every reader join. See pages 34-35.

The Editor



For all Mack Chain Drive Trucks—Use

GREB MACK SPROCKET PULLERS

A one man Tool, adaptable to all sizes of sprockets on all models of Mack Trucks.

No. 70 Puller, for removing all Sprockets up to and including 15 Tooth. Price, $45.00.

No. 70X Puller, for removing all sizes of Sprockets from smallest to and including 18 Tooth. Price, $45.00.

No. 70Y Puller, for removing Yellow Coach Differential Worm Gear. Price, $45.00.

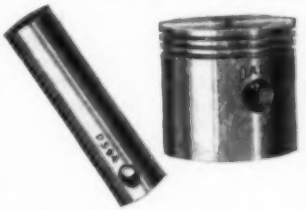
Made of high grade steel, comes complete with bar wrench.

TEN DAYS' TRIAL—If your distributor cannot supply you, send us your order. Try it for 10 days. If YOU are not satisfied return it to us and we will refund the money.

THE GREB CO.

310 STATE STREET BOSTON, MASS.

HIGH MILEAGE! LOW COSTS



Burgess-Norton Piston Pins and Dall Pistons have conclusively proven, by actual comparison with other makes, they will reduce operating costs.

Burgess-Norton Mfg. Co.
GENEVA, ILL.

Dall Motor Parts Co.
CLEVELAND, OHIO

This Hint Saves Many Doors

TO the Editor: I am passing this hint on to you for the benefit of other readers. When I took charge of the repair department for this company about four years ago, I found that one of the largest expense items was for repairing cab doors, frames and standards, caused by open doors striking some object and splintering the wood before the screws give away.

After experimenting for some time, we finally tried sawing each hinge one-half way through the flat side, as near the swinging bolt or pin as possible. Since then we have had to replace very few wood standards or door frames, as the hinges either break off or bend back, depending on the material, and we still have sufficient strength in them to carry the doors.—*Fred Carlisle, Superintendent, Yellow-Cab Service Co., Tulsa, Okla.*

A Few Interesting Answers to the Replacement Question

"In connection with the advantages or disadvantages in purchasing our parts from vehicle manufacturers as against automotive jobbers, we buy from both of these sources. We prefer to buy from the automotive jobbers because we feel we get a more complete stock of parts and there is some guarantee as to stability back of these parts. However, such items as motor blocks, transmissions and axles are obtainable only from the manufacturer. This is particularly true where trucks are being made by manufacturers who make it a habit to change their models every year, which prevents the dealer from carrying a complete line of parts for more than the current model.

"Another advantage in so purchasing is seen in the fact that when we tie up with one or two jobbers who handle replacement parts of a reputable character, they will give us service any time we want it—day or night. Besides, in purchasing from the jobber the discount is greater, and consequently the cost of maintenance is less."—*Timothy Baldwin, Supt. of Delivery, Purity Bakeries, Chicago, Ill., operating a fleet of 2250 trucks.*

"We do not maintain our fleet on the unit replacement plan, but carry in stock a representative amount of parts, such as gaskets, pins, springs and bushings. We purchase about 90% of our parts from vehicle manufacturers' dealers and 10% (batteries, electrical parts and piston rings) from jobbers. Sometimes the jobber does not have all the parts we want, so we lose just that much time and eventually have to go to the service station anyway. We do not require parts at night, but believe that the dealer is in a better position to render night service than the jobber. Sometimes out of ten items ordered from a jobber, he can only supply three or four."—*R. Dukay, Supt., S. Skarloff & Sons, Philadelphia, Pa., operating a fleet of 17 trucks and 8 passenger cars.*

"We maintain our fleet partly on the unit replacement plan, carrying such units as clutches and transmissions complete. We also carry in stock ignition parts, relined brake shoes, axles and other small parts. For Fords, our main source of parts supply is from the Ford dealers. For other vehicles we get most of our parts from the jobber. We find that one N.S.P.A. jobber will serve us at any time and the Ford dealers are open 24 hours. All of our repair work is done at night, except complete rebuilding jobs."—*H. A. Boone, Garage Supt., Southern Bell Tel. & Tel. Co., Atlanta, Ga., operating a fleet of 20 trucks and 75 passenger cars.*

"We do not carry any complete units in stock, such as engines, clutches, transmissions, etc. The majority of our replacement parts and supplies are purchased direct from the vehicle manufacturers' dealers. Items which we know are standard and are handled by the automotive jobbers, we have found that we can purchase some parts from the jobber for less money and consequently confine our purchases in this manner. As to parts required at night, when it is necessary to purchase parts at this time, we find it is best to purchase them direct from the vehicle manufacturers' dealers. —*R. F. Rowe, Automobile Service Department, Wilson & Co., Chicago.*

(Please tear out and mail to the Editor, The Fleet Owner, 90 West St., New York)

Question-of-the-Month Club

Question No. 10—Tires

Have you a "tire-contract" or do you purchase tires outright?.....

.....

Do you keep records of your tire mileage and costs?.....

If so, please give your tire cost per vehicle, per mile, or in any way that you have figured it.....

Are tires bought on a "first-cost" basis, or do you consider the "cost-per mile" when taken out of service? .....

How often are the following tests made? (Please report on each.)

Test for proper inflation?.....

Check for glass, nails, etc., in tread?.....

Test for leaky valves?.....

Check for missing lock nuts, caps, etc?.....

Check for small cuts and injuries?.....

Check for extreme tire wear?.....

Check for proper wheel alignment?.....

Examine for bent rims?.....

Examine for loose wheel bearings?.....

Tightening all lugs and bolts?.....

Do you repair your tires and tubes, or is this work "farmed out" to other shops?.....

Vehicles on solid tires and single pneumatics can be economically changed over to dual balloons. Shall we send you a free booklet explaining just how this can be done?.....

Special Remarks.....

.....

.....

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Name of Firm.....

Address.....

City and State.....

Your Name.....*Position*.....

(Please tear out and mail to the Editor, The Fleet Owner, 90 West St., New York)

Two Interesting

Shop Jobs

Operator Makes Novel Pipe Vise Stand and Salvages Blacksmith Shop's Anvil

IN the maintenance of shop equipment incidental to the successful operation of their fleets and also in the building of special tool equipment that is not readily available from automotive jobbers, many fleet operators are making good use of the oxy-acetylene welding equipment, which is a part and parcel of their regular shop equipment.

Take for instance the special pipe-vise shown on this page, as an example of something that was easily constructed and welded throughout. This particular operator required an easily portable pipe vise, not only for holding pipe, but other round objects as well, such as shafts, couplings, axles, etc.

Strength and lightness being important considerations, oxy-acetylene welding was the logical means of fabrication. Tripod legs were cut from lengths of two-inch pipe and curved at the bottom to give solid support at the base, and at the top, so as not to interfere with the vise mechanism.

(Please turn to page 64)

This blacksmith's anvil was successfully welded.

STOP SHIMMY

with the new self-locking

BEAR SHIMS

Only shim of its kind—ABSOLUTELY *can't lose out.* Corrects axle tilt and stops wander, weave, hard steering, and shimmy. Inserted between spring and axle by merely loosening U-bolt. Sizes for all cars, trucks and buses. Order from your jobber or send direct.

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Whether you use Vellumoid ready-cut gaskets or sheet Vellumoid, there's no loss in handling. Vellumoid does not dry out or crumble when kept in stock. Rubbing the edges does not crack it or knock it to pieces.

And when cutting and putting on gaskets, there's no waste, no breakage, tearing, or patching.

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THE REAL REPLACEMENT GASKET MATERIAL

For the Oil, Gasoline, and Water connections.

The Vellumoid Co., Worcester, Mass.

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TIRE CHANGER

ONE MAN OPERATION
Cuts down overhead
HANDLES EVERY JOB
Keeps the fleet moving
NO COSTLY REPLACEMENTS
Saves repair delays
SAVES FLOOR SPACE
May be moved easily
CONVENIENT HEIGHT
RUBBER PAD PROTECTION
Protects paint on wheels
Speeds up the jobs

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Including three hand tools
See your jobber or place order direct and give jobbers name. May we send you descriptive folder?

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COMPLETE with 3 HAND TOOLS
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Bigger loads-fewer drivers

Make yours a heavy duty fleet with Little Giant 6-Wheelers—without adding to operating expense. Only 3 hours to install and 8 holes to drill. Two point frame contact—strong—correct balance and traction. New lower prices. Write today for full information.

Little Giant Products, Inc.
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140 Caroline St. Peoria, Ill.

LITTLE GIANT 6-WHEELER

Servicing the Airplane

Special Airport Equipment, Recently Developed, is of General Interest to Fuel Purveyors

IN planning for the dedication of the Cortland Airport, Cortland, N. Y., sometime ago, Lieutenant Harold R. Mull, who is in charge of this port, realized that with the number of planes visiting the field he must have mobile facilities for supplying them with gasoline, oil, water, air, etc.

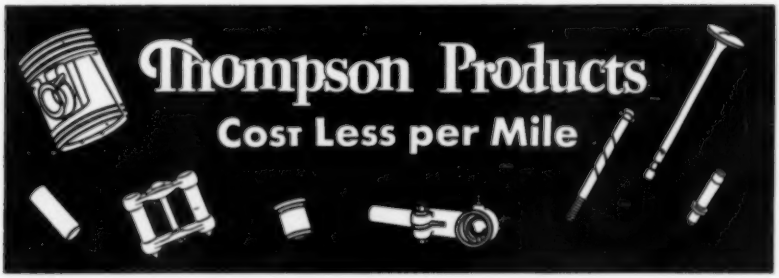
Through the assistance of the Brockway Motor Truck Corporation, whose eastern plant is located in Cortland, a special Airport Service truck was designed, built and put into service at the Cortland port. A brief description is here given of this special job, with the thought that other fleet operators in the gasoline and oil business will find it of interest.

The equipment consists of Brockway-Indiana standard chassis, mounting a 450-gallon, three-compartment gasoline tank with gasoline pump, hose and meter. There are also three auxiliary tanks for air, water and oil, all of approximately 45 gallons capacity and specially designed so that high pressure air may be used to force the liquids through hose up to the airplane. For this purpose a two-cylinder, heavy duty automotive air compressor is provided, operated from a power-take-off and controlled from the driver's seat.

Complete accessory equipment includes hose reels, hose basket, searchlight, four 2½-gallon Foamite cylinders and two 1½-quart hand fire extinguishers. Oil pressure meter, tool box and parts racks are also provided.

Gasoline is forced to the airplane tank by a power-driven pump which is capable of delivering from ten to thirty gallons per minute. This pump is driven by a power-take-off operated from the driver's seat.

In conformity with the Bureau of Underwriters' Standard requirements the pump is equipped with an air chamber by-pass which regulates the pressure on the filling line and



FLEET OWNERS

The speed with which buses can be operated depends upon their acceleration, their deceleration and the time required for passenger interchange. **National Pneumatic Air Doors eliminate delays in passenger interchange.** Write for booklet.

NATIONAL PNEUMATIC COMPANY

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precludes any possibility of placing the gasoline under high pressure, or what is commonly known as "back-pressure" should the filling nozzle be suddenly turned off or the supply cut off.

Gasoline is pumped through a *pipe* line strainer where it is filtered before it enters the registering meter, which measures the total and quantity of gasoline used. From the *meter* the gasoline is forced into the fuel tank through a special heavy duty hose fitted with a quick acting and quantity control nozzle.

The gasoline hose is carried on a hose reel at the rear of the truck which protects the hose when not in use and adds to the efficient servicing of the airplanes.

The water is forced under air pressure from the water tank to the radiators of the airplanes equipped with a water cooled engine. The hose used in this connection is of heavy duty type and equipped with a quick acting shut-off bibb or water cock.

A hand operated, measuring oil pump is provided so that oil may be forced direct from the oil tank to the crankcase of the airplane engine if desired. Hose of sufficient length and size is provided which is fitted with a quick acting shut-off nozzle.

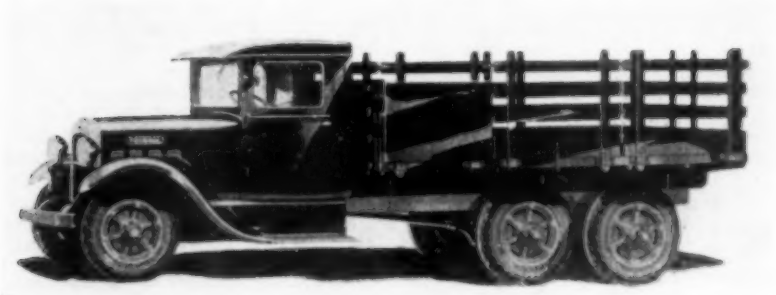
Air is furnished the air tank by a two cylinder, heavy duty automotive type air compressor capable of maintaining sufficient pressure to inflate the airplane tires and operate the water tank.

Fifty feet of air hose is carried on a hose reel over the air tank and in such a position as to afford efficiency in service with the least effort. A standard make of air chuck of the heavy duty type is provided with the hose.

A swivel spot-light of a high beam candle-power with a 10" diameter lens is mounted on the forward end of the gasoline tank and in such a position that it can be trained on the airplane being serviced.

A built-in tool compartment along each side of the gasoline tank provides space for carrying small tools, spark plugs, shovels, wrecking bars, tow lines and like equipment that may be desired.

Another airplane-service truck, not mentioned in this article. It pumps fuel through meters directly to the tanks of the plane, also providing oil, water and air for the plane's tires.



New Federal *Offered*

New 3-Ton, Six-Wheel Truck Available With Choice of Four or Six-Cylinder Engines

GREATER pay-load capacity at lower initial cost and operating expense is the claim of the Federal Motor Truck Company in their new low priced, six-wheel, six-brake truck. This new Double-Duty Federal is declared to open the way to better truck profits by providing a 3-ton capacity at the cost and operating expense of a 1½-ton truck.

In addition, Federal, in this six-wheel model, features improved riding comfort and road-cushioning qualities made possible by a flexible construction which allows either axle assembly, the individual wheels on either side, or both wheels on either side to move up and down independently. The rear wheels are mounted on two pairs of rear springs (one pair on each side) and the Federal design provides weight distribution on all six wheels.

This ease of riding is a valuable feature in a truck as well as in a passenger car, as the reduced shocks and jars from road impacts prolong the life of the body and chassis while protecting the pay-load. Perishable commodities and breakable merchandise are thus hauled with a minimum risk of damage.

The use of hydraulic brakes on all six wheels as standard equipment is a feature of the new Federal which secures driving safety and increased tire mileage due to the constant and even distribution of weight and the independent adjustment of each wheel on uneven road surfaces.

The new Federal six-wheel chassis is produced with either a four or a six cylinder engine. Both engines are of the L-head type—the four cylinder engine developing 48 H.P. at 2500 R.P.M., and the larger one developing 60 H.P. at 2600 R.P.M. Three-point suspension, silent chain timing drive, pressure feed lubrication, water pump at side of cylinder block, air cleaner, fuel pump and oil filter are added features of both engines.

Chassis features include 4-speed, selective sliding gear transmission;

heavy 6-inch, pressed steel, channel type frame; and full-floating, forward rear axle. This new six-wheeler is offered in four different wheelbases, the four-cylinder engine in 140¼" and 164¼" lengths, and the six-cylinder engine in 144¾" and 168¾" lengths.

Good Gasoline Requisites

RECENTLY Dr. O. C. Bridgeman of the Bureau of Standards discussed the ideal characteristics of gasoline before the Philadelphia Section of the Society of Automotive Engineers.

"The essential properties that a gasoline must possess," said Dr. Bridgeman, "are ability to give easy starting, rapid acceleration, good distribution, and low dilution of the crankcase oil, together with non-corrosiveness from the presence of sulphur, lack of tendency to vapor-lock, high antiknock value, and lack of gum-forming constituents. An ideal fuel would be one which fulfills these requirements completely, but some of the requirements are at variance with others, so the commercial product must be a compromise.

"The gasolines available today represent each refiner's attempt to balance the varying requirements of present-day automobile engines and an economic use of the stocks and crudes available. It can be seen, moreover, that no one specified gasoline can best meet the requirements of all cars. Variations in design necessitate differences in fuels to produce optimum performance with each. The oil refiner and the automobile engineer are working more closely together today than ever before to so modify fuels and engine design that a more generally satisfactory matching of car and fuel will result.

"When the car designer will so lay out his fuel system that gasoline temperatures of 200 deg. Fahr. as have been observed at times, are impossible, the problems of the refiner will be reduced and the satisfaction of the fleet owner increased. No reason exists why fuel systems cannot be so designed that the maximum temperature of the gasoline in the system will not rise more than 30 deg. above the temperature of the atmosphere. With all cars meeting this condition, the conflict between ease of starting and vapor lock will be minimized," according to Dr. Bridgeman.

"Improvements are also possible to a lesser degree in manifold design and its relation to distribution of the fuel mixture. A parallel case is in a general improvement of the combustion-chamber design so that higher compression-ratios can be employed without necessitating gasoline of abnormally high antiknock value. There are at present on the market cars of high compression-ratios which do not require fuel of as high an antiknock value as do other cars of lower compression-ratios, indicating the importance of combustion-chamber design."

How to Fit Lapped Pins

AN interesting booklet and wall-chart is now offered free to readers of this publication, that takes up the subject of the proper fitting of lapped piston pins in all types of pistons, including cast iron, aluminum alloy, etc.

This is a free service that all fleet maintenance men will appreciate. Free copies can be obtained from the Editor, or from Burgess-Norton Mfg. Co., Geneva, Ill. Just ask for a copy of "How to Fit Lapped Pins."

The New Paige Commercial

Graham-Paige Motors Corporation Offers Improved Model Thousand-Pound Capacity Delivery Vehicle

THE Graham-Paige Motors Corporation has announced a new model delivery car of 1000 pounds capacity, listing at $895, with either the panel or screen body. In general construction and appearance, the new model follows closely the previous Paige commercial car, retaining all its special features of design. The bodies are identical with those on the former model except that the length of the loading space has been increased.

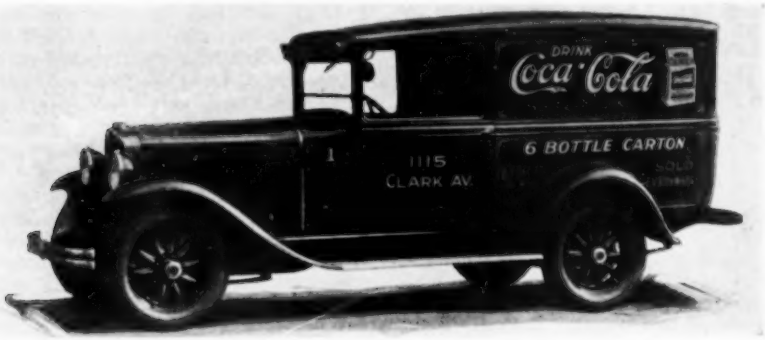
The new delivery car chassis is of 115-inch wheelbase, mounted on 18-inch wheels with 5½-inch six-ply tires. The power plant is a six-cylinder engine of 3⅛-inch bore and 4½-inch stroke, 207 cubic inch displacement, developing 66 brake horsepower. The drive is through a single-plate clutch and a three-speed transmission; the final drive is by spiral bevel gear and a semi-floating rear axle, the gear ratio being 4.7 to 1. Service brakes are internal hydraulic on all wheels, with 12-inch drums; the parking brake operates on the transmission shaft.

The side channels of the chassis frame run the full length of the body, eliminating unsupported overhang at the rear. Heavy rear bumpers, of special Graham-Paige design, are mounted on the ends of the frame at standard height.

Shatter-proof plate glass is standard equipment throughout. Both bodies are equipped with an electric illuminated visor sign. The spare tire is carried in a fender-well on the right side, on a bracket that is mounted directly on the chassis frame. Full length steel running boards serve as side bumpers. A single key operates the steering and ignition lock, door lock, and spare tire lock.

Precautions against the entrance of fumes, dust, and water feature the entire body construction. The

(Please turn to page 44)



exhaust discharges to the side instead of at the rear, to safeguard the load and the crew from gas. The floor boards are laid with an expanding steel seal between them, and the rear doors are weather-stripped and equipped with steel flanges that fit closely into recesses in the body structure. These doors are so mounted as to give an unobstructed opening the full width of the body. The front doors are 33½ inches wide, facilitating loading operations.

In appearance, the new models are typically Graham-Paige, retaining the characteristic lines of the previous cars. Chromium finish appears on the radiators, front bumper, headlamps, spare tire clamp, and door handles.

Facts About Precision Gages

SOME very interesting facts about Johansson gages were related by Faye White, of the Ford Motor Co., who, in outlining the history of that instrument before the Northwest Section of the Society of Automotive Engineers, said that Carl Johansson, "the father of accuracy," is the only living man who has reduced anything definitely to millionths of an inch. When foreman of the Swedish Government Arsenal, he conceived the idea of measuring by means of solid blocks. The difficulty of this problem lay in producing, in steel, two flat surfaces that parallel each other perfectly. The first set of steel blocks meeting these conditions was made in 1897.

Having at last procured the right sort of steel, Johansson had to produce a finish so fine as to give a surface resembling quicksilver in appearance. Put together, two of these surfaces would resist a straight pull of 210 lb. per sq. in. at right angles to the surfaces. When a number of blocks thus made are built up together, a twist does not affect the measurement of the complete assembly more than 0.000002 in. per block.

Three types of Johansson gages are now produced, being guaranteed to vary, respectively, not over 2, 4 and 8 millionths of an inch. They are intended for laboratory inspection and working operation, respectively.

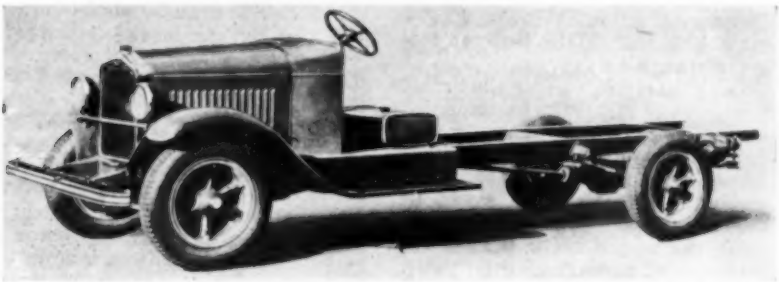
There is now, in the Ford plant in Detroit, a laboratory set that is accurate to less than 0.000001 in., the only set of its accuracy in the world, according to Mr. White. With this set 120,000 combinations —almost any that might be required—can be made. The holders handle blocks in combinations up to 80 in. in length, and 81 blocks are available to make the 120,000 different combinations. In a bar of 80 in. there are more than 100 joints.

These gages are affected by temperature, their absolute accuracy being attained at 68 deg. fahr. The high cost of these sets is largely due to the fine finishing of the faces; these may be refinished without affecting their accuracy.

When Henry Ford contracted with Carl Johansson to come to America and direct the manufacture of his gages, the Swede agreed to teach the work of surfacing to one man. The work is done according to a written formula that is unknown to Mr. Ford himself. At the suggestion of the Johansson organization, the gages at the Ford plant are turned in twice daily for inspection.

New Fours *by* White

Six New Models Offered in Two Series for Fast Express and Light Heavy-Duty Operations



SIX new four-cylinder truck chassis, designed and built to meet modern traffic conditions and to provide maximum performance with low operating costs are announced by The White Company, Cleveland, Ohio.

They have been designated as 160, 161 and 162, and 210, 211 and 212. Deliveries will start immediately. They are recommended for the delivery field, florists, laundries, retail stores, fast express, contracting work, coal delivery and light road construction operations.

These models are additions to the already complete White line of four and six-cylinder trucks and busses and give the company complete coverage in the entire range of truck and bus activity.

A four-cylinder unit power plant having a bore and stroke of 4 x 5¾ inches is used in all of the above new models. This is an L-head motor of White design, equipped with battery ignition, generator and starter. Clutch is of the single-plate type, operating in oil. Four-speed transmissions are used, of the selective type, with one reverse.

The 160, 161 and 162 series are offered on a wheelbase of 138 inches, with an optional wheelbase of 157 inches. Gear ratio on these models is 4.73 to 1 standard, with lower and higher ratios optional. On the 210, 211 and 212 models, the standard wheelbase is 148 inches, with optional ones of 131, 170 and 196 inches. Gear ratio on these models is standard at 5.67 to 1, with lower or higher ones also optional.

Brakes on all models are of the 4-wheel, Lockheed hydraulic, internal-expanding type, with gun iron drums. The emergency brake is located at the rear of the transmission and is of the external contracting band type. Cast steel wheels, with U-section spokes are found on all models. The various models are available in a wide selection of tire sizes and with either single or dual wheels, as specified. Balloon tires are optional at extra cost.

What is "Draw-Bar Pull?"

DRAW bar pull is the foundation of all motor truck operation and must be considered whenever haulage requirements, and especially those including trailer equipment, are being computed, according to E. W. Winans, Equipment Engineer of the Federal Motor Truck Company.

Draw bar pull can be illustrated as follows, Mr. Winans explains: If a man took a small wagon and pulled it by attaching a peddler's spring scale to it, the pounds pull registered on this scale would be the draw bar pull necessary to move the wagon. The heavier the load on the wagon, the higher would be the reading on the scale. The draw bar pull would be less on a hard smooth surface and more on a gravel or sandy road. Ascending a grade would further increase in pounds pull the reading on the scale.

These different conditions, Mr. Winans stated, are all met with in motor truck operation and the required horsepower generated by and transmitted to the engine, clutch, transmission and rear axle are the same whether the load is on the truck's own axles or whether the same gross load is pulled on a trailer.

The engine, of course, furnishes the propelling power and it is this power, translated into torque, the rear axle gear ratio, and the size of the rear tires, that are used in figuring draw bar pull. The gears in the rear axle reduce the road speed and increase the pulling power and should be selected according to the load to be carried and the condition and grade of the roads to be travelled. Torque is the constant pull or twisting effort on the fly-wheel exerted by the engine.

Specifically, draw bar pull equals the engine torque in inch pounds multiplied by the rear axle gear ratio divided by the wheel radius.

It requires about 30 pounds draw pull per ton to move a load on level paved roads. Therefore, if the load to be moved weighed 26 tons, including chassis, trailer and load, the first figure multiplied by the second would give 780 pounds draw bar pull required to pull the entire load on the level. If the draw bar pull available in the truck were 1420 pounds, it would leave a surplus of 640 pounds remaining to take care of hills, bad roads, wind resistance. An extra 22 pounds per ton is required for each degree (1½%) of grade.

This example is given by Mr Winans to show that there is a limit to the amount of load that can be pulled by a truck or tractor, the amount of load being governed entirely by the draw bar pull developed.

If a truck operator attempts to pull a load in excess of the known capacity of a truck or tractor, disappointment and financial failure will be the certain result, according to Mr. Winans.

Better Clutch Servicing

A SERVICE manual on the subject of clutch plates and clutches has recently been issued by Burgess-Norton Mfg. Co., Geneva, Ill., and will be sent free to interested readers on request. The Editor will get a copy for you, if you prefer, without obligation of any kind. Ask for the "Clutch Manual."

Diamond T *Offers* One-Tonner

New Model, Listing at $695, is Offered in Standard and DeLuxe Models on Two Wheelbases

A NEW offering of the Diamond T Motor Car Company, Chicago, for 1931 was exhibited for the first time at the New York Automobile Show. It is a one-ton truck, initially shown in three different styles. In addition to the chassis model, two other units were on view—one with a deluxe panel body and the other with a coupe cab and stake body. The chassis list price is $695.

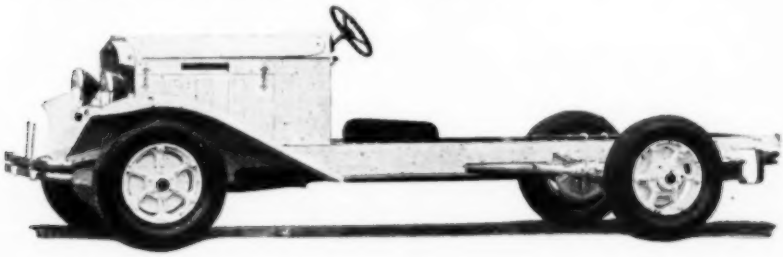
The new one-tonner is powered by a Hercules six-cylinder engine with a bore and stroke of 3⅜" x 4¼", giving a piston displacement of 224 cubic inches. The engine incorporates such features as seven-bearing crankshaft, pressure lubrication and valve cooling.

Among other significant features of the new truck are Lockheed hydraulic brakes on all four wheels, with 15 x 2¼-inch heavy cast alloy iron brake drums, large clutch, silico-manganese springs and six-inch frame of 7/32-inch stock. The chassis is built in two wheelbases, accommodating bodies to 11 feet in length and a large number of tire options are available to meet individual requirements for various conditions of load and road, it is announced.

From the point of view of appearance, the development of the special deluxe model is of particular interest. Chassis construction includes all the heavy-duty features of the standard one-ton model, successfully combined with a newly developed radiator, hood and cab treatment.

A new v-type radiator in chromium plate is enriched with highlighted mouldings and carries vertical radiator shutters. Hood and cab are smoothly stream-lined in accordance with modern practice. An aeroplane type deluxe instrument panel employs special dials and gauges that are readily visible. Unusual driving comfort, according to the manufacturers, is offered by providing a natural driving position on the deep seat cushions.

In the cab, windows and windshield have crank control and special no-draft ventilation has been provided.



What Causes the Knock?

THE exact cause and mechanism of the "fuel knock" or detonation frequently observed in automotive engines remains today a mystery, according to Dr. D. P. Barnard, director of the engine testing laboratories of the Standard Oil Company at Whiting, Indiana.

A great amount of research has been conducted in an effort to discover the cause, Dr. Barnard pointed out in an interview, but it has been largely fruitless.

The knock itself is familiar enough to everyone and it is well established that it is one of the greatest obstacles to progress in engine performance.

Fortunately, though the disease itself is little understood, the cure has been developed to the point that fuel knock can be prevented satisfactorily for most practical purposes.

Detonation occurs when the temperature of the burning charge becomes excessive during the earlier stage of combustion. It may be induced by the high temperatures accompanying high compression ratios, by the presence of carbon which prevents heat from escaping to the jacket, or by preignition arising from overheated surfaces such as the exhaust valve, protruding gaskets, spark plug skirts, etc. It manifests itself to the automobile driver by its characteristic "pinging" during acceleration and hill climbing. The noise of detonation, while annoying, is not in itself harmful.

The violent mechanical shock responsible for the noise, however, is most destructive, particularly to such materials as the babbitt of bearings and aluminum pistons. Battered bearings and cracked pistons are only a few of the constantly occurring evidences of the punishment which engines take as a result of detonation.

Still more serious is the heat which is radiated to the cylinder walls during detonation at rates greatly in excess of any occurring during normal combustion. This high rate of radiation results in lost power, overheated valves, pistons, etc., and, of course, raising the temperature of the charge which, in turn, causes the detonation to become still more violent. The cycle is a particularly vicious one and, once detonation has become really intense, is usually terminated by failure of the engine. In aircraft engines, because of the small capacity for caring for excess heat, this characteristic of detonation is most serious.

It is fortunate that detonation can be prevented to an extent sufficient to provide for almost all practical purposes. Many advances in engine design have been made which permit increased compressions in spite of detonation. The use of aluminum alloys of great strength and high heat conductivity, and, "antiknock" fuels, particularly those employing lead tetraethyl with its great capacity for preventing detonation at high temperatures, have played the major part in engine development. The ability of ethylized gasolines to combat detonation under conditions of violent overheating is of great importance and is the basis for some of the most recent advances in military aircraft engines.

Detonation is still a major stumbling block to engine progress, but as research and development continue it can be safely predicted that still greater advances will be made.

1½ Tonner *by* International

"Six-Speed Special" Has Two-Speed Rear Axle, 136-Inch Wheelbase and Four-Cylinder Engine

A NEW type International Harvester Six-Speed Special motor truck of increased rated capacity, longer wheelbase, and heavier construction, shown in the accompanying illustration, has recently been announced by International Harvester Company of America, Inc., Chicago, Ill.

This new model is provided with a rear axle of the spiral bevel gear type, with two speeds for each of the transmission reductions. Thus there is a total of six forward speeds, giving a low range for heavy pulling and a high range for smooth highways and city streets. There are two speeds in reverse.

The wheelbase of the new 1½-ton, Six-Speed Special, is 136 inches. Overall length of the chassis is 200 inches and the total chassis weight is 2,980 pounds. The engine is of the four-cylinder, L-head type, and mounted in a unit assembly with the engine are the single-plate clutch and transmission.

While many types of bodies are available for use with this new model, one of the most popular for farmers is the body shown—a triple combination stock rack, 60-bushel grain box and flat bed, each being quickly convertible to one of the other forms.

Other specifications include: battery ignition of the 6-volt type, with starter, generator and distributor; four-wheel, mechanical, self-energizing, internal-expanding brakes; cast spoke-type steel wheels; balloon tires; cam-and-lever type steering gear.

Army Transport Maintenance

DISCUSSING army transport motor maintenance before the Society of Automotive Engineers recently, Lieut. Col. Brainard Taylor stressed the necessity for a maintained organization of coordinated motor-transport in the United States.

He remarked that the maintenance of motor-transport in the Army is functionally the same as is the maintenance of motor-transport in commerce; but war imposes conditions not encountered in commerce which require special organization, practices and administration and therefore peacetime planning and training.

His presentation of the subject therefore was made with future war-time requirements in view, and in the hope that commercial advantages may be discovered in military thought and practice. His intent was to visualize war-time transportation in which the maintenance of motor-vehicles is an important factor that cannot be solved as an independent problem.

Using a chart showing the organization and supply methods in a theater of operations, Colonel Taylor explained the operation and maintenance of the motor-transport vehicles in detail, dividing them into five natural "echelons" or steps of maintenance in each of which there are three distinctively different elements—the personnel, the shop and tool equipment, and automotive supplies—and made detailed comment thereon. In conclusion, he called attention to the diverging requirements of commerce and war, regarding the use of highways, that need forethought and coordination in time of peace. He said also that these will materially affect maintenance in the Army, as well as having a direct effect commercially.

Chicago's New Trolley Buses

THE city of Chicago put fifteen new trolley buses in active service recently. This consignment of electric trolleys brings the total number operated in Chicago to seventy. Of this number, fifty-one have been secured from the Westinghouse Electric and Manufacturing Company.

Chicago entered a program of electric bus transportation in March, 1930. An order for forty-one trolley buses was issued by the Chicago Surface Lines, twenty-nine of which were furnished by the Westinghouse Company. In June another addition was made to the fleet of electric driven buses and on August 15, a final order of fifteen was placed.

The new buses employed in the Chicago district are forty-two individual capacity and carry two 50-horsepower motors. They are luxuriously equipped with leather upholstered seats, electric heaters and ventilators, and other conveniences.

Electric bus transportation has received a great impetus in the last year. Detroit, New Orleans, Philadelphia and other large cities are recognizing the advantages and economy of this type of local transportation. An experimental electric trolley is being tried in Brooklyn, New York.

Westinghouse engineers have been largely responsible for developing this phase of transportation and have contributed many refinements to the system, it is declared.

The Trouble Shooter

A DEPARTMENT devoted to correspondence from readers of THE FLEET OWNER. Any questions having to do with fleet maintenance will be answered. All properly signed inquiries will be replied to by mail and such of them as are believed to be of interest to other readers will be published in these columns.

Address your questions to the Trouble Shooter Editor. We must decline to reply to correspondence not signed with the writer's full name and address.

Drowned in Gasoline

Question: We are having trouble with the Model "S," six-cylinder Buda motors in our fleet of Checker Cabs. The trouble is that they load up number 4, 5 and 6 cylinders with raw gasoline and the plugs get drowned in gasoline. These motors are equipped with Zenith carburetors and the only hot air that gets to the motor is by the small hot spot around the exhaust manifold. The intake manifold is of the Swan patented type.

We have tried Stromberg carburetors and adjusted them as lean as possible. After running the motors for an eight-hour shift, and with the motor idling, raw gasoline is expelled from the exhaust.

This condition also prevails on new motors of the same make. The manifold, when removed, will be found to contain raw gasoline—this is plainly visible in the rear half of the manifold which serves cylinders 4, 5 and 6. We do not have any other hot-air devices, except the manifold supplied with the motor. What can you suggest to remedy this condition?—J. G., Bronx, New York City.

Answers: The first thing we would advise you to do is to check on the grade of gasoline you are using in winter weather. It is a well-known belief that many taxicab operators in New York City are using a very low grade of gas which is not easily vaporized in winter weather. If a low grade of gas is used, probably extra heat will be necessary. This can be accomplished by seeing that the heat-control valve in the manifold is full open; also by the use of a stove which can be attached to the exhaust pipe and fitted to the carburetor. These stoves, we understand, can be bought from any automotive jobber, or from the carburetor service stations, and they are not expensive.

We also find that in fleet operations, particularly, that drivers use the choke excessively. It is also a known fact that idling the motor for any particular length of time will produce raw gasoline in the manifolds.

Would suggest that in very cold

weather you use fabric or cardboard shields on the inside of the hood louvres, as with the large radiator and thermostatic-control shutters on same, it will not be necessary to use the louvre openings.

Flooding of the intake manifold is sometimes caused by a faulty vacuum tank. When the float is leaky and does not rise all the way, the valve that leads to the intake manifold connection will not close, with the result that raw gasoline is drawn into the intake manifold, directly from the top of the vacuum tank. This is only a suggestion. You will probably be able to eliminate your condition by using a higher test gasoline during extreme cold weather and by cautioning your drivers against long idling periods and excessive use of the choke. You might also try a set of "hot-running" plugs, designed for cold-running motors.

Timing an AB Mack Engine

Question: Can you give me the timing data that is necessary for checking and tuning up a Mack truck engine, Model AB. We are interested in getting such data as valve timing, ignition timing, tappet clearances, etc. We enjoy reading the Trouble Shooters' Department each month.—G. A., New York City.

Answer: On the Mack AB engine, the camshaft should be set so that the intake valve opens at .006" piston travel *after* top dead center. Valve tappet clearances should be set at .008" for the intakes and .015" for the exhaust valves. Ignition should be set so that the points break at exactly top dead center, and the amount of separation should be .022". The firing order is 1-3-4-2. It is important that the proper tappet clearance be established before trying to time the valves. When setting the ignition, the spark lever should be retarded, of course.

Timing Chevrolet "Six" Engine

Question: I note that the Carter Carburetor Company, in their January, 1930 Chevrolet tune-up chart, gives ignition timing as 12 degrees ahead of top dead center. We have no way of measuring 12 degrees on the flywheel, as all the markings we can find are T. D. C. Can you suggest any means of properly setting the ignition on this job?

Answer: It is almost impossible to accurately measure 12 degrees on this enclosed flywheel. It would be far better to go by piston travel. On this engine, 12 degrees is equal to .043" piston travel, so that this can be set by having the spark lever fully advanced and making sure that the points break at .043" piston travel, *before* top dead center. This can be measured, when the cylinder head is off, with an ordinary dial indicator, or surface gauge. This information applies to 1929 and 1930 Chevrolet engines.

Complete Service Necessary

FOR the benefit of the fleet service station mechanic, O. C. Holaday, service manager of the Bendix Brake Company of South Bend, Ind., has outlined the important points to be considered in the proper servicing of truck brakes and wheels. Unless these points are covered when a complete job is required, there is a tendency to adhere only to the main brake mechanism with little regard for other controlling parts.

The points described by Holaday

follow: Adjust and reline brakes; adjust and lubricate linkage; check tie rods, align the front wheels, check spring clips and wheel bearings.

When the above points are included in the servicing of brakes and wheels, the job can be counted on as complete and reliable if each phase of the work is done carefully. If the truck owner refuses to have a complete job done, the superintendent or foreman, however, should describe to him any needed repair so that it may be done as early as possible.

There are many times when a vehicle is driven into a garage and the time is so limited that only the brake bands can be adjusted before the driver is again on his way. In such an instance it is impossible to inspect the entire chassis.

If Paint Get in Your Eye—

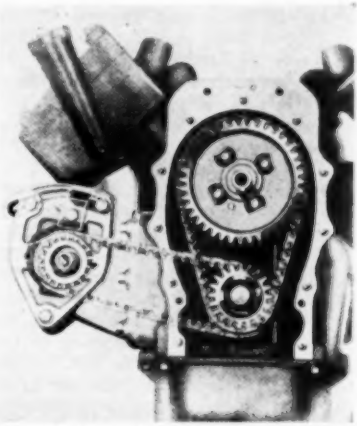
MOST fleet garages do a considerable amount of lacquer painting. From a service bulletin comes the following item of interest: "Should you splash or spray some lacquer in your eye, follow this course; wash eye with pure amyl acetate, obtainable in any drug store; follow with a 15 to 20 per cent solution of boric acid. Then add two or three drops of pure castor oil."

Adjustment on a La Salle Chain

Question: I have a 1929 La Salle in the shop with a slap in the timing chain. Is there any adjustment that can be done to this without taking off the front timing chain case cover? The boss thinks that he should not have to buy a new chain because the car runs well enough, but wants me to adjust it. What do you suggest?—Telephone inquiry.

Answer: For your convenience, we are printing a picture of what the timing chains of this car look like, when the front cover is removed. You will note that the horizontal chain can be adjusted by swinging the generator outward. The vertical chain has no adjustment, and if this is too loose you might be able to shorten it by taking out a link, although it would be much more satisfactory to put in a new chain.

When a chain "stretches" so much that it slaps against the side of the case, it has practically outlived its usefulness. This is particularly true where a short chain is used, such as on the La Salle. If you show this to your employer I am sure you will have no difficulty in "selling" him on the idea of a new chain.



The horizontal chain can be tightened by swinging the generator. The vertical chain should be replaced if loose.

Use the Same Engine

Question: We have a three-ton Reo 1928, 6-cylinder dump truck which was bought in the fall of 1928 and in the fall of 1929 it had a new motor installed, due to excess wear of the pistons and cylinder walls. The truck has been used another year and the motor seems now to be in as bad condition as was the original motor.

As the rest of the chassis is in good condition, we would like your advice as to what other make and type of motor and transmission you would recommend for this truck, as we do not want to put in another motor of the original type, as it does not seem practical for the service that the truck does—gravel hauling. What would you suggest? —D. L. & P. Co., Baraboo, Wis.

Answer: Frankly, we are rather surprised that you want to change motors, inasmuch as this particular make of truck has always seemed to give a good account of itself in all lines of businesses.

We note that the truck is being operated as a gravel hauler and are inclined to believe that the chief reason for this apparent premature wear of pistons and cylinder walls is because of the conditions under which the truck is operated. You appreciate, of course, that when running in a dry, sandy or gravelly country, a certain amount of this sand and gravel dust is "breathed" into the motor through the carburetor air intake. According to our records, this truck was not factory equipped with an air cleaner or an oil filter, and we would recommend that these be installed on any equipment that is used in such service.

We do not wish to advise you to use any other motor in this chassis, as this is strictly an engineering problem, and one which would have to be carefully worked out, to say nothing of the possible physical difficulties you would run into in trying to install a different engine which might necessitate alteration of the chassis.

Is it not possible to have this engine rebored and fitted with new pistons, rings and pins? This would probably be the cheapest way out of it and vou could then "lock the door after the horse ran away" by installing an air cleaner and oil filter on the engine.

We are taking the liberty of referring your inquiry directly to the Reo factory at Lansing and feel sure that they will have some interesting suggestions to offer you.

Again, the Timing Data Book

Question: We operate a fleet of assorted trucks and passenger cars, ranging from Ford and Chevrolet coupes and trucks to five-ton units with trailers. Where can we obtain a book giving authentic valve and ignition timing data to cover not only passenger cars but trucks as well? Who puts it out and how much does it cost? Perhaps you can send us a copy C. O. D. and oblige.—L. H. T., Milwaukee, Wis.

Answer: We know of one book that has been compiled in collaboration with the engineers of motor, car and truck manufacturers. This covers all passenger cars and trucks and gives ignition timing, valve timing, firing orders, valve tappet clearances and breaker point separation distances. We regard this book as the most complete and authentic work of its kind that has ever been brought to our attention.

It is not possible for us to state the publisher's name in these columns, so we are sending you this information by separate letter. Should any of our readers, how-

ever, desire this information as to who publishes the book and how it can be obtained, we will be glad to forward the publisher's name on request.

The Truth About Turning Radius

TURNING radius is often upset by everything that changes pitch, toe-in, caster or tracking. A new free booklet, recently brought out, explains turning radius so you'll readily understand.

Another book tells all about wheel and axle alignment and gives front axle specifications for all models of cars, trucks and other automotive vehicles.

The Bear Mfg. Co., Rock Island, Ill., will be glad to send free copies of these books on request to any fleet maintenance man. Use your letterhead when sending for them. Free copies may also be obtained from the Editor of this publication.

A Practical Viscosity Test

A VERY useful and profitable guide to fleet maintenance men interested in motor lubrication from the standpoint of better motor performance and longer wear is contained in a booklet just issued, entitled "A Practical Test for Viscosity."

The booklet explains the important factors in motor lubrication, especially viscosity, and gives a scientific solution to the problem of testing the lubricating value of motor oil continuously, and while the motor is running.

Free copies of this booklet will be sent on request. Write directly to the Visco-Meter Corporation, 318 Grote Street, Buffalo, N. Y. The Editor will get a copy for you, if you prefer.

Can't Understand Sprocket Marks

Question: I am having trouble putting on a timing chain on a 1925—"55" *Flint touring car. What do the sprocket marks mean? I also notice that it says "eleven links" on the timing chain cover. What does this mean? This car had been taken apart in some other shop and the owner thinks it is out of time. We have taken the chain off, and are stuck with the problem of how to properly put it back. Can you send a man over to do this? We will be glad to pay any cost in connection.—New York City telephone call.*

Answer: Your problem is not so difficult as you think. If your timing case cover says "eleven links" this means that you should put the chain on the sprockets so that there will be eleven links (or twelve chain teeth) between the marked spaces on the camshaft and crankshaft sprockets. There was an article in our March issue which illustrated this point quite clearly; we would refer you to page 22 of that issue (March, 1930).

Theoretically, the following is the correct valve and ignition timing: This car used a Continental 6E motor. The intake valve opens at 10 degrees or .038 inches piston travel *after* top center. Firing order is 1-5-3-6-2-4. Valve tappet clearance is .006 inches hot. The distributor points should open approximately .015 inches. Ignition occurs at top dead center with the spark in the *retarded* position.

We regret very much that our services do not include the sending of men out on repair jobs, but we believe that if you turn to page 22 of our March issue, you will have no difficulty. We are always glad to answer mail and telephone inquiries.

Timing in Degrees and Piston Travel

Question: It is with pleasure that I read your column and find you use inches in piston movement for setting ignition and valve timing. Can you send me data in inches on the following: Model 60 Durant, 1929. The inlet valve opens 4 degrees after top dead center and the spark occurs 16 degrees before top dead center, according to my records. If you can send me this in inches, piston travel, I'll appreciate it. Also please tell me how you arrive at this method.—A. H., Brooklyn, N. Y.

Answer: We recommend setting valve and ignition timing in thousandths of an inch piston movement because practically all of the engines used in passenger cars today are high compression, and valve and ignition timing of a high compression engine must absolutely be correct. If the valve and ignition timing of a high compression engine is off three thousandths of an inch or more, it will affect the operation and speed of the car.

It may interest you to know that several car manufacturers have discontinued flywheel markings and are giving their valve and ignition timing settings in thousandths of an inch piston movement and have also drilled a ⅛ inch pipe plug hole over the last cylinder for timing.

Referring to the last paragraph of your letter, the Model "60" Durant, intake valve opens 4 degrees or .005" after top dead center. The spark occurs on the early models 16 degrees or .092" before top dead center with the spark advanced; on the late models, 8½ degrees or .026" before top dead center with the spark advanced.

The method of changing degrees into thousandths of an inch piston movement is based upon the stroke of the engine and is mostly a mathematical problem to figure out.

How to Time a Star

Question: We have a Star car, model M2 and find no ignition or timing marks on the flywheel. We have set it to the best of our ability, but it does not perform well. Please give me the correct ignition setting on this model, and oblige.

Answer: Look at the serial number of this car first. The model M2 was manufactured in 1928 and on all jobs after serial number 484200 an automatic advance was installed. If your job is higher than this number, the correct timing should be .060" piston movement, *before* top dead center, with the spark lever in the advanced or running position. No doubt this is the model you have, as it is very sensitive to ignition timing.

If the car's serial number is lower than 484200, it should be timed so that the spark occurs exactly at top dead center, with the spark lever in the fully retarded position.

Simplifying Industrial Truck Tires

A PRINTED pamphlet on simplified practice recommendation R103-29 covering Industrial Truck Tires is now available according to an announcement by the division of simplified practice of the bureau of standards.

Copies of this recommendation, which has been instrumental in establishing dimensions for widths of tires and nominal wheel diameters, can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents each.

▪LITERATURE▪

Lift the Hood is a booklet that tells all about modern magneto construction, outlining many of the faults of older types. Write directly to United Bosch Magneto Co., Inc., Springfield, Mass., for your free copy.

For Faster Work at Lower Costs, some interesting literature, surveys, etc., pointing out the value of compressed air in the fleet shop, are offered by Curtis Pneumatic Machinery Co., 1930 Kienlen Ave., St. Louis, Mo. Catalogs are also available on car washers and rotating lifts. When writing, state whether one or all are desired. No obligation whatever.

Fan Belt Size Book has recently been issued by Dayton Rubber Mfg. Co., Dayton, Ohio. Complete and compact, the book provides a ready reference to the fan belt requirements of all makes of passenger cars, trucks, tractors and Ford circulating pumps. It covers all V-belts, flat belts and also the "cog" V-belts.

Changing to Pneumatics is easy when you have a copy of the new "Changeover Booklet" offered by Dayton Steel Foundry Co., Dayton, Ohio. Fleet owners are invited to write for free copies, either to the Editor or to the Company.

Deluxe Pistons are catalogued in an intelligent manner in their latest catalog which is now being sent to our readers who will ask for it. This illustrates and describes the line of heavy duty pistons long manufactured by this company. Write to DeLuxe Products Corp., 310 Lake St., LaPorte, Ind.

Timing Chain Hand-Book is offered by Baldwin-Duckworth Chain Corp., Springfield, Mass. This is a very instructive booklet of intense value to fleet owners who work on this type of front end drive.

Repairman's Guide, 1931 Edition, is now being distributed free by Federal-Mogul Corporation, Detroit, Mich., to our readers who will write for it. Among other things, the book carries complete listings of connecting rod bearings, pin bushings, bolts, nuts, bearing anchor screws, etc., for all trucks, cars and buses.

General Motors Trucks: Illustrated literature describing all types of General Motors Trucks is offered by General Motors Truck Company, Pontiac, Mich. When writing for same, please state the type of vehicles in which you are particularly interested.

Motor Truck Analysis. This is a 44-page book that gives the experiences of 5,584 fleet operators operating trucks of various makes totalling 46,017. In the book are many facts about operation-maintenance-and-depreciation-costs per mile, average numbers of stops, number of hired trucks used, methods of paying drivers, types of special bodies, etc. There is no cost for this book. Write to General Motors Truck Co., Pontiac, Mich., or to the Editor. Ask for Booklet 201.

Handy Governors: Literature on governors for any type of motor vehicle is offered free to fleet operators. Write directly to Handy Governor Corporation, 3929 W. Fort St., Detroit, Mich.

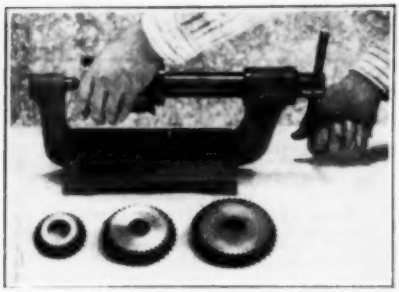
Camoah is the story of engine power thieves. An interesting folder on this subject is offered by Packard Electric Company, Warren, Ohio. New catalog sheets describing ten new items are also offered. The products recently introduced include ignition cable sets, bakelite spark plug protectors, rubber distributor hoods, portable shop lights, terminal assortments, etc.

Progress in Transportation is the name of a new publication devoted to informative news about truck operation. If you will send your name and address to The Reo Motor Car Company, Lansing, Mich., or to the Editor, the book will be sent free every month.

Snap-On Wrenches and other tools are interestingly illustrated and described in general catalog and special literature issued by Motor Tool Specialty Company, 14 E. Jackson Blvd., Chicago, Ill. The form of tool service offered by this company is of especial interest to fleet owners.

Thompson Valves are interestingly described, indexed and priced in a new catalog recently issued by The Thompson Products Co., Cleveland, Ohio.

Note: All of the above books are offered free of charge. Write for any that interest you. If this is your busy day, tear out the page, check those desired and mail to the Editor. We will see that you are promptly supplied.



New Hand Chamfering Machine

THE Dall Motor Parts Company of Cleveland, Ohio, manufacturers of Dall cast iron and aluminum pistons, as well as shop equipment, consisting of quick-change adapters, chamfer machines—motor and belt driven—reamer drives and chamfer cutters, wish to announce the production of a new unit in their line in the way of a hand chamfering machine, which is being manufactured in addition to their two power units for this purpose.

This machine is of simple, sturdy construction, of the horizontal lathe type, adaptable to pistons up to seven inches in diameter and ten inches in length. It is most suitable for the small shop where a power machine would not be required.

Chamfering, as an operation in finishing of pistons, is indispensable for accurate machine work, especially in this age of modern engine design.

The machine is priced well within the reach of every automotive shop, and is completely equipped, with four cutters, covering the range of all popular sized pistons encountered.

What YOU *New Products of Interest*

This Weed Catalog is Free

A NEW catalog has been issued by American Chain Company, Inc., on the entire Weed Chain line, with the inclusion of the entire line-up of Weed Automotive Accessories and Campbell Cotter Pins. These are sold through jobbers.

Complete price and size information is given on all types of chains for passenger cars and on chains for pneumatic and solid tired vehicles.

Every item is shown in pictures and full description of its use is appended. Information on Sling Chains, Tow Chains, Battery Carriers, License Plate Brackets and Muffler Cut-Out Chain is given adequate space.

Copies of this book may be had

WANT to KNOW

by writing American Chain Company, Inc., at Bridgeport, Conn. The Editor will get a copy for you, if you prefer.

New H-S Brake Drums

A NEW type of automotive vehicle brake drum has recently been developed by Hunt-Spiller Mfg. Corporation, South Boston, Mass. It is made in two types—with and without the ribs on the outside of the braking face.

The ribs on the bevelled portion of the drum are to strengthen the drum against distortion; in fact both types of ribbing are designed for this purpose and also to aid in the dissipation of heat, as the radiation surface is increased. Naturally, the drum with the ribs across the outside of the braking face will provide for equalization of the heat across the width of the drum.

The manufacturers also point out that this arrangement will tend to prevent squealing, since the vibrations can travel but a short distance before encountering an area of different section and their action thus checked.

New Thompson Valve Guides

THE new line of Thompson valve guides were on exhibition during the recent Automobile Shows at the booth of the Thompson Products Corporation, of Cleveland, Ohio.

There are two types of guides, plain and graphited. The plain guides are made of high grade pearlitic iron alloyed with nickel and chromium. Nickel provides a compact, dense wearing surface and chromium contributes hardness, according to the maker.

Graphite guides are the same as the plain type in external appearance. However, the internal bearing surface is grooved spirally. Graphite is compressed into the grooves, serving to minimize the tendency of the valve stem to stick, and providing a self lubricating unit.

Both types of guides have a hardness of 90-95 on the Rockwell B scale, as compared with ordinary soft iron guides with hardness of 70-80. They are core cast rather than cast and drilled, insuring that the bearing surface is of the wear resisting alloy, the manufacturers further state. Sold through jobbers.

New Victor Gasket Sets

A COMPLETE set of replacement gaskets, packed in an individual gasketfold container, is the latest convenience offered to buyers and sellers of gaskets by the Victor Mfg. & Gasket Co., 5750 W. Roosevelt Road, Chicago, Ill.

These time-saving sets simplify the gasket problem of the repairman, meeting the needs of the average overhauling job. They include gaskets for cylinder heads, manifolds, oil pan, valve cover, etc.

The sets bear the same number as the cylinder head gasket, with the prefix "FS" and are packed in the handy, standard Victor gasketfolder, with a distinguishing green label.

Sets are now available for all of the more widely used cars. Complete information may be had from the Editor, or direct from the Victor Company. A new complete gasket catalog also has just been issued. Free copies sent on request.

Truck Display at Dodge Plant

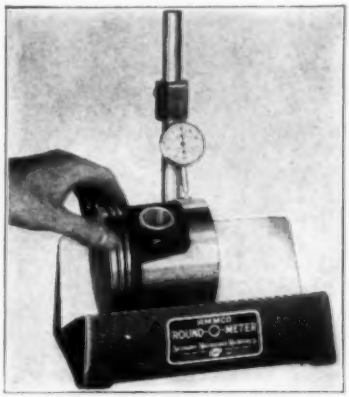
ONE of the largest and most complete displays of trucks in the world is now on exhibit at the Dodge plant in Detroit, comprising scores of trucks and representing the many models offered by this manufacturer.

The exhibit is to be permanent and includes both chassis and mounted body models, in the standard, special and vocational types, and is said to meet the need of hundreds of different lines of business.

The display covers an area of 54,890 square feet and also includes a display of passenger cars, school buses and taxicabs. It is open from 9.00 a.m. to 5.00 p.m. Everyone is invited.

The Ammco Round-O-Meter

A NEW tool for checking roundness and size of any round object from three-quarter inch to six inches in diameter, is announced by the Automotive Maintenance Machinery Company, 816 West Washington Blvd., Chicago, Illinois.



The Round-O-Meter, as it is called, requires no skill to operate. There is no chance of error. It instantly gives the mechanic an accurate picture of roundness of pistons, bushings, sleeves, bearings, pins, etc. The direct reading indicator gives accurate readings to half thousandths of an inch. Measurements are made with the use of gauge setting rings furnished with the instrument.

Round-O-Meter is specially adaptable to fitting piston pins, and other round parts and also for rapid and accurate checking of round parts in production work.

New Downdraft Carburetor

A NEW type of downdraft carburetor has recently been perfected by the Marvel Carburetor Co., of Flint, Mich., subsidiary of Borg-Warner Corp. This is known as the model D-O.

The model D-O is of the downdraft, air-valve expanding type that is used in conjunction with a specially designed manifold operating under the Marvel automatic heat control system to govern properly the temperature of the ingoing mixture of fuel and air. This functions at all operating speeds and loads, it is claimed.

One feature is the method by which air enters the carburetor at the top-most point of the installation above the engine block. This offers the greatest freedom from dirt, fumes and excess heat. It is then carried downward through the mixing chamber, picking up atomized fuel and then to the heating chamber in the header assembly where it is vaporized and directed into the intake manifold.

The carburetor consists of three nozzles, delivering into a mixing chamber, and a spring-controlled air valve.

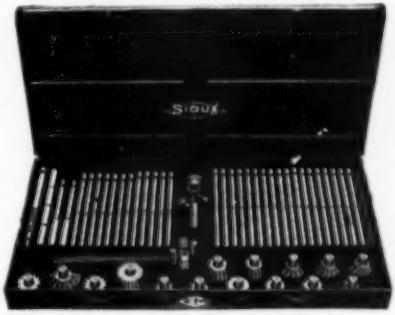
The nozzles are of the fixed opening and non-adjusting type. The low-speed nozzle is situated in a fixed air-opening; the others called the primary and secondary high-speed nozzles are located above the air valve and controlled by the same.

One of the outstanding features is an economizer metering-pin jet which surrounds a fuel metering-pin connected to the throttle. This pin controls the flow of fuel to the high speed nozzles.

Sioux Tapered Pilot Set

THIS kit, recently announced by Albertson & Co., Sioux City, Iowa, makers of the famous "Sioux" line of tools, contains 32 sizes of tapered pilots which will take care of most types of valves and valve seats that the service man is called upon to service.

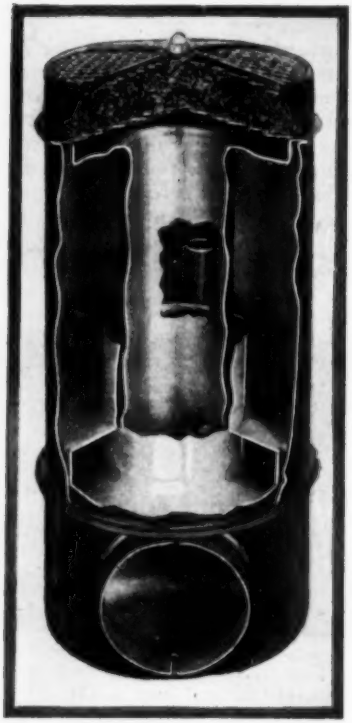
In addition to the pilots, the set includes a valve seat indicator for checking the valve seats as to concentricity. A complete set of Sioux reamers covering all sizes is also included, in both roughing and finishing types. There are also four sleeves, two pins, a knock-out pin and a sleeve wrench. A No. 85 brass hammer is also part of the kit.



This outfit is packed complete in a metal box and lists at $115.50. It is designated as Sioux Reamer and Tapered Pilot Set No. X-925. An interesting book entitled "Bringing Factory Precision Standards into the Shop" is recently off the press, and will be sent free on request to the Editor, or to Albertson & Company, Sioux City, Iowa.

AC Intake Silencer Combination

THE combination air cleaner-carburetor intake silencer, shown in the photograph, is being produced by the AC Spark Plug Company; it is a cylindrical shaped device into which are built multi-



ple chambers and tubes. As every type engine has different "noise" characteristics, silencers must be especially designed to fit them.

The principle of operation is that if one sends sound waves into the intake system which are out of step with those coming out, they will balance or neutralize each other and the result will be that no noise will get out into the engine compartment from whence it would ordinarily filter up into the car body.

That the silencer will be used almost universally in the near future is virtually assured, engineers state. Buick, Chrysler and Cadillac have already adopted it on their 1931 cars which were recently announced and many others are in the process of adapting it to future models.

The purpose of the silencer is to eliminate "power roar" which becomes most audible at wide open throttle, such as occurs in hill climbing, accelerating and at high speeds. This roar, engineers discovered, originates not in the exhaust, but in the intake system and emerges from the carburetor inlet.

Vertical Shutter for Fords

PRODUCTION was recently started by the Pines Winterfront Co., of Chicago, on a new vertical, detachable type of automobile radiator shutter for Fords. This type may be used to replace the old horizontal Winterfront.

Outstanding points claimed by the manufacturer of this shutter are:

It reduces the warming up period to seconds, keeps the motor at the correct operating temperature, prevents condensation and excessive crankcase dilution, reduces carbon and saves gasoline, retains the warmth inside the car and the area of opening is larger than in the horizontal type. The new and unusual feature is that the shutter may be closed on stopping the motor, thereby retaining the heat for a very long period.

Heavy Duty Brake Tester

TO make possible a quick, accurate test of brakes on trucks, busses and other heavy vehicles under actual road conditions, with the vehicle under its own power, the Weaver Mfg. Co., of Springfield, Ill., recently introduced the heavy-duty brake tester shown here.

This equipment is designed to be placed near the entrance of the garage and since it will operate in either direction it can be used with equal convenience for checking vehicles as they drive in or for checking adjustments made in the shop.

To test all four brakes, the vehicle is driven on to the four moveable plates and the brakes are applied. The relative braking effort exerted by each brake is immediately shown by the rise of colored liquid in the gauges, which are positioned to correspond with the four wheels.

An interesting booklet has been prepared and will be sent to any of our readers without obligation. It describes in full detail this latest development in modern brake testing equipment. Local automotive jobbers carry these in stock. The editor will get the booklet for you, if you desire it, or you can write directly to Weaver Mfg. Co., Springfield, Ill.

New Schebler Carburetors

TWO new one-inch carburetors, for Chevrolets and Fords respectively, and known as the new Schebler "T" Torpedo Models, have just been brought out by the Wheeler-Schebler Carburetor Co., of Indianapolis, a subsidiary of Borg-Warner corporation.

Both carburetors are equipped with over-sized throttle openings which give them a greater capacity than the regular, or rather, the ordinary one-inch carburetor. Both carry a ⅜ inch size venturi and have a No. 3 metering assembly.

These carburetors carry small accelerating pumps ⅝ of an inch in diameter and also have special discharge nozzles. There is a very slight difference on the flow setting of the high speed needles on these two carburetors. The Chevrolet requires a slightly richer mixture than the Ford engine on power mixture.

All-Purpose Brake Tester

A NEW, medium-duty, all-purpose Cowdrey brake tester has been brought out by the Bendix-Cowdrey Brake Tester, Inc., of South Bend, Ind., a subsidiary of the Bendix Aviation Corporation.

This new type of brake tester is of the drive-on-back-off type and is self adjusting for wheelbases ranging from 100 inches to 228 inches, and is said to be able to handle the testing of 99 per cent of all vehicles on the highways, including heavy trucks as well as passenger cars.

Maintenance Problems

(Continued from page 19)

is true that equipment designed to give good service in a truck will render a good account of itself in any automobile engine; on the other hand, the opposite is not always true. Many items will perform satisfactorily in passenger cars, even over an extended period, but will not endure the heavier demands of truck service with its greater weights and sustained average speeds.

Consider the truck or bus engine. It is invariably called on to operate hours at a time at high operating temperatures and with frequent full horsepower demands. The passenger automobile engine, on the other hand, usually operates only a fraction of the time and at considerably lower operating temperature. The demand for full power is made only at rare intervals.

The logical place then, for testing truck or bus materials is on a vehicle in service. In this way it is possible to determine just how the material or accessory in question will perform. The results are not to be known in a day, nor can the report of any one man be conclusive. Vagaries of the weather, varying loads and different drivers all form part of a test that will prove or disprove the merits of the article in actual service.

Long-term tests with careful and well-kept supporting records seem to be the better way to analyze a product. In fact, they represent the only method fair to both the operator and the manufacturer.

It must always be borne in mind that, like any other business enterprise, a commercial operating vehicle company must show a profit to justify its continued existence. Vehicles cannot be operated anywhere and any time to gain a "good-will" reputation. Schedules must be laid out to enable each trip to earn its full share of operating expenses. In other words, if the revenue from all trips scheduled fails to meet the full cost of service, which includes allowances for taxes, interest on investment, retirement reserve, and the like, the company will cease to be an operating entity.

Two Interesting Jobs

(Continued from page 36)

To assure rigidity, horizontal members were cut from smaller pipe and welded at each end to the base of the tripod legs. Immediately below the vise mounting, the legs were securely welded to a triangular piece, thus adding further strength to the supports.

Discs cut from plate were welded to the ends of the legs, giving a flat surface, greater stability and a final touch of neatness to the sturdy fixture. The ease of construction and sturdiness of this piece of equipment are readily apparent from the picture.

An interesting example of salvage is shown in the other picture, which portrays the repair of a large 2,200-lb. anvil used in the fleet's blacksmith shop. An unusually heavy blow fractured the anvil at the narrowest part. Instead of scrapping it or trying to patch it with makeshift braces, the operator got out his welding outfit and restored it to practically perfect condition by bronze-welding.

The photograph, taken three months after the repair was made, shows the anvil still in first class condition.

Practical Bus Maintenance
(Continued from page 16)

machine for taking care of any class of work. We have found that it is much cheaper to repair our own bodies whether they be of steel or wood construction. The repair cost of wooden-bodied coaches is far greater than that of the metal and ply-metal body construction. There seems to be no way of preventing the deterioration of the wooden bodies, but if the painting is followed up properly in the metal bodies, there seems to be no limit to their life.

All exterior painting is done by the spray method. The paint shop is equipped with a large spray booth. Coach windows are covered with a preparation composed of soap chips, glycerine and whiting. We try to arrange the color scheme so that there will be as little masking as possible. Usually this can be arranged so that one masking will do. The painting of the destination signs, where a large number are required at one time, can be very cheaply done by the silk-stencil method. If only a few signs are required, cheap paste-board stencils are used. The quick-drying enamel paints are found more satisfactory than the lacquers, as they can be applied over old paint or lacquer and do not give trouble on wood or mouldings. While they do not clean up quite as easily as lacquer, we feel that the results are somewhat more satisfactory.

Brake adjustments are made over brake-adjusting pits, as shown in one of the pictures. This adjustment is not done at the time inspection is made, most of the coaches in heavy service getting a regular brake-adjustment and inspection every five days. At this time accurate records are made as to the pounds drag on each wheel, with and without the brakes being applied. We have charts showing the exact drag required, based on the weight of the coach and its make, so that the men can get the proper adjustment. Records are kept showing the pressure that was secured both on the service and the emergency brakes. These records are filed so that, in case of an accident the company can use them to show the condition of the brakes.

(Editor's Note: This article has been abstracted from a most thorough paper on Motor Coach Maintenance prepared by Mr. See and read before the Transportation Meeting of the Society of Automotive Engineers held at Pittsburgh, Pa., recently. In a forthcoming issue of this publication we are planning to run an additional article, abstracted from the same paper which will outline some of the "paper-work" incidental to the maintenance of this fleet. Acknowledgment is hereby made to both Mr. See and the Society, for their courtesies in making the publication of these articles possible.

"Before each winter season we flush the cooling system, and then only when motor heats. We used Thermo-glycerine about three years ago which failed to function, causing repair bills to radiators, etc., of over $1200, directly attributable to the compound. Since then we have used alcohol because it works and is cheap and dependable. We check radiators every cold day to insure proper amount of alcohol."—*H. Oldroyd, June Dairy Products Co., Inc., Newark, N. J., operating a fleet of 35 trucks.*

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Servicing 136 Electrics

(Continued from page 32)

When one considers the nature of the express business with its thousands of trucks and employees and the proportionate number of shipments, it is apparent that even small economies can constitute an enormous saving, if practiced on a large scale.

For the class of work that it is called upon to perform, that is, short hauls with frequent stops, it is safe to say that the electric truck is a most efficient form of carrier and the great fleet of these vehicles that are now operated throughout the country is ample proof that this type of traction has come to stay.

It is also evident that in the larger cities the traffic congestion and the demand for speedier and more flexible units of transportation is taxing the horse-drawn vehicle to the utmost capacity.

Either of the foregoing contingencies would have justified the inauguration of the electric truck in express service and it is assumed that the express company had both in mind when General Superintendent of Motor Vehicle Equipment E. E. LaSchum commissioned the first "juice-box" way back in 1915.

It is interesting to note that the Railway Express Agency is the largest fleet operator of electrics in the world, having in service approximately 1,800 electric street trucks and 650 industrial trucks. When it is considered that this company's sole business is transportation, the extent to which they use electrics is most significant.

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